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DECEMBER

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VOLUME 43

NUMBER 6

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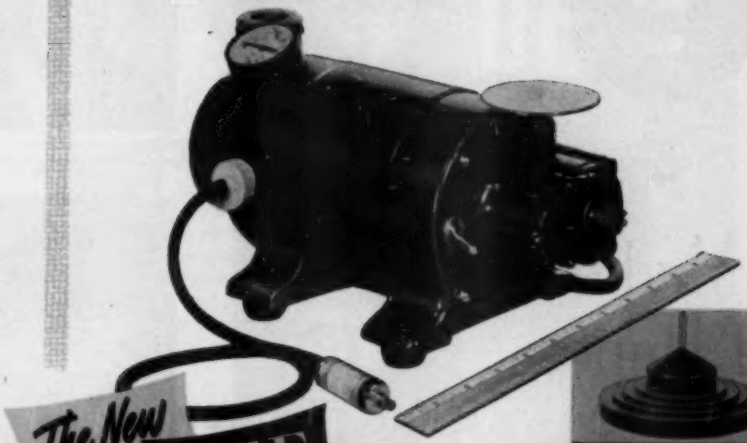

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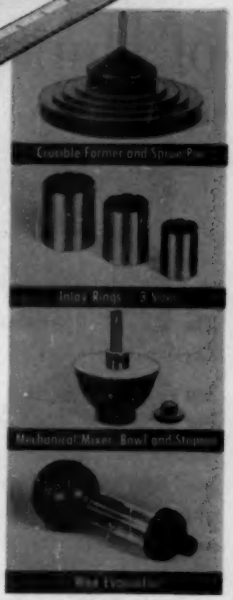

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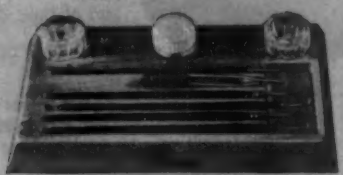

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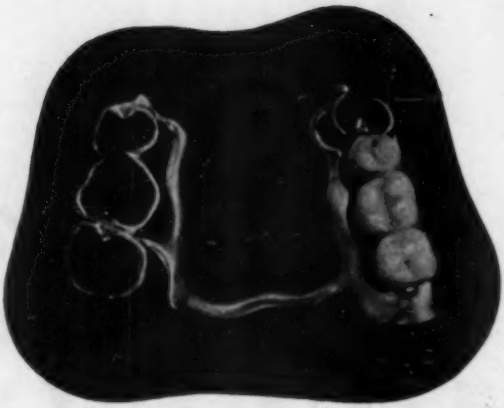

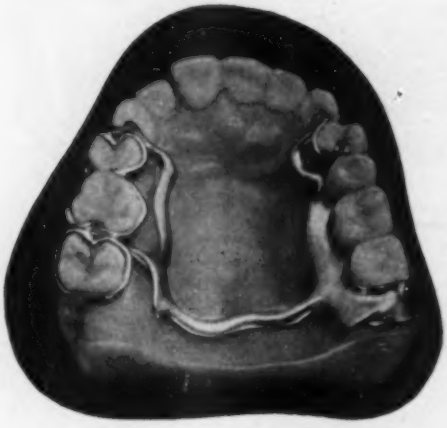

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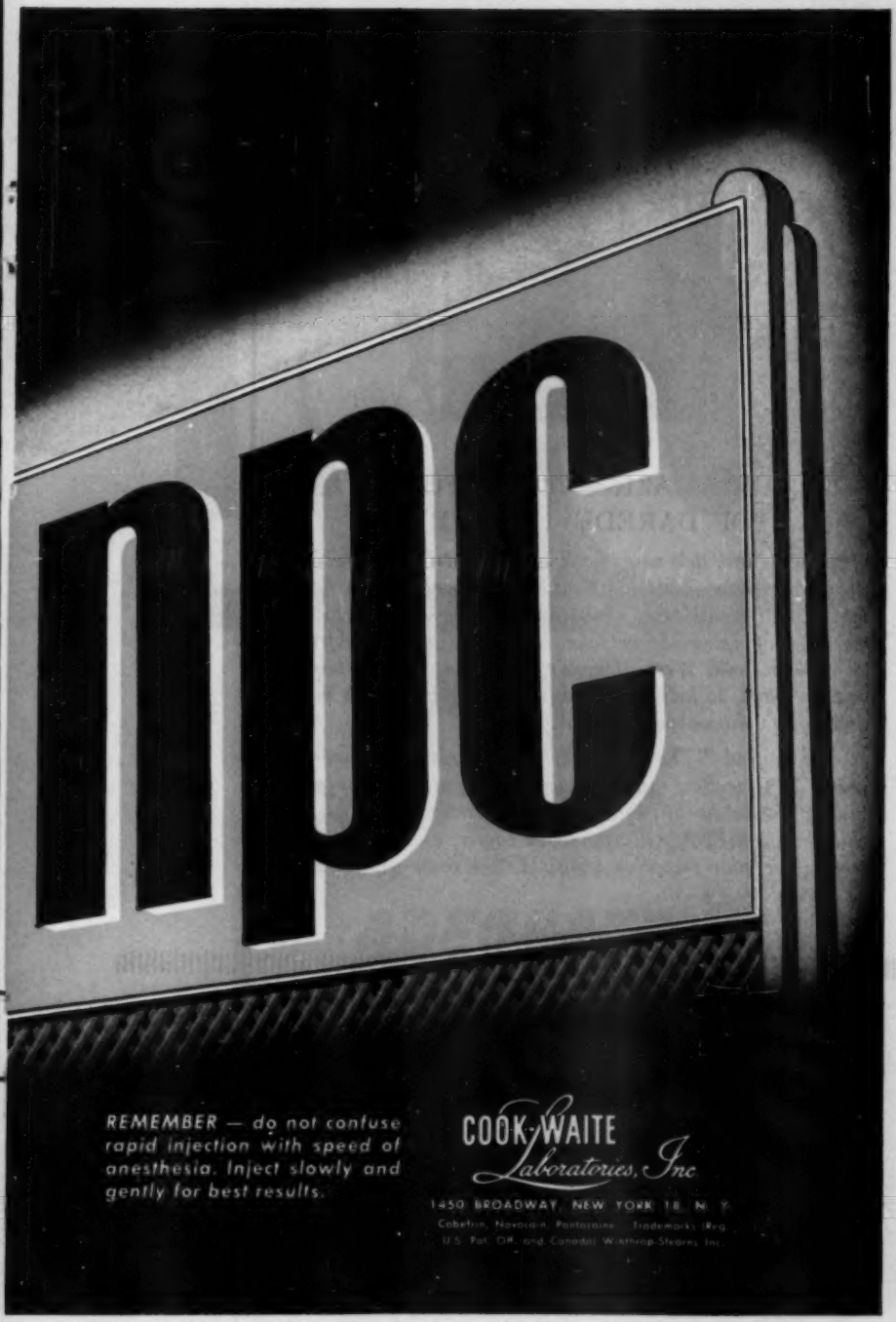
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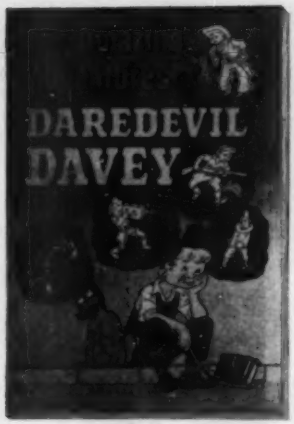

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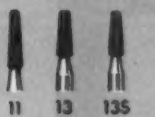

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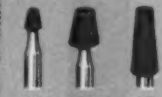

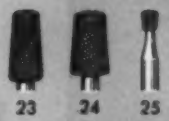

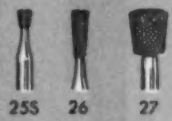

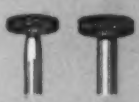

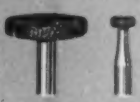

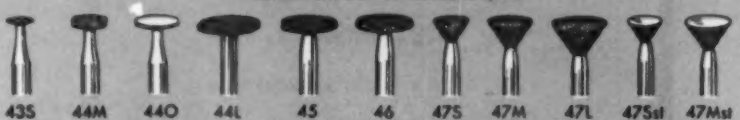

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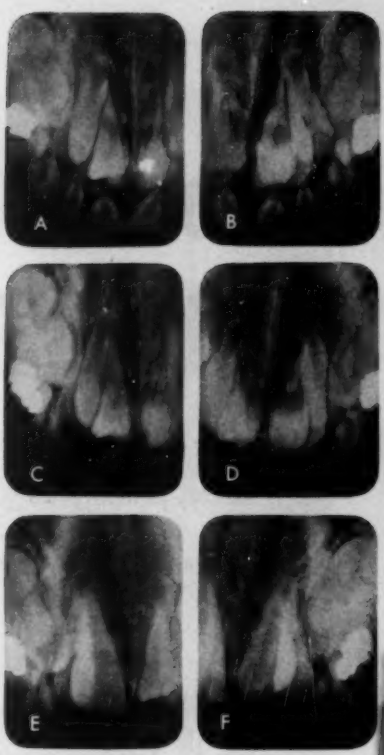

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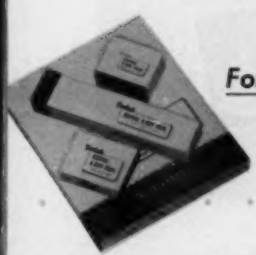

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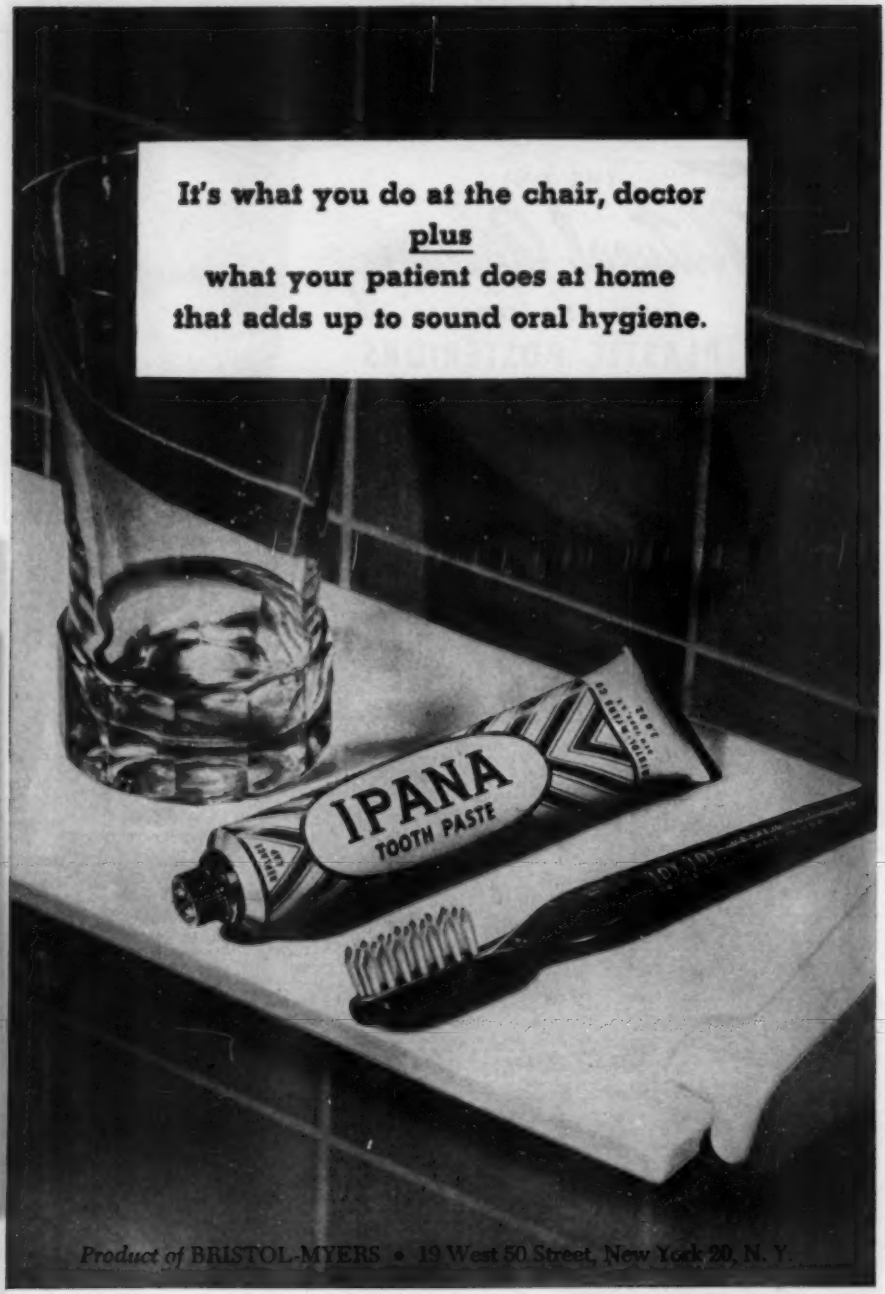
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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

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Pitfalls in a full denture service

Frank M. Kyes, D.D.S., Bethesda, Md.

A great deal has been written about acceptable technics for making full dentures but not much has been written about the factors that doom dentures to failure. These failure factors are important and if every dentist had a clear idea of how not to make dentures he would probably keep himself and his patients out of a great deal of unnecessary trouble. In any line of endeavor there are pitfalls and full denture construction is no exception.

To turn potential pitfalls to the best account, these exigencies should be arranged serially so that the operator can check his technic as he proceeds. They should also form a mental catalog that will enable the dentist to check faulty dentures, step by step, until he unearths the cause of failure.

The causes of denture failure are grouped for convenience as faults in base areas, vertical dimension, occlusion, gross construction and failure to consider phonetics. Two additional factors, failure to consider physiologic processes and inadequate advice to the patient, are also included because they too are sources of trouble.

FAULTY BASE AREAS

Faulty base areas generally stem from underextension, overextension, faulty postdams, lack of relief and warping of the bases during curing of the acrylic resin.

Underextension • Underextension is most common on the lower denture and most frequently occurs in the area of the retromolar pad and the posterior part of the buccal flange of the denture. This persistent fault apparently rises from any of three causes—namely, the use of underextended impression trays, the tend-

Presented before the Section on Full Denture Prosthesis, ninety-first annual session of the American Dental Association, Atlantic City, November 1, 1950.

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Captain, DC, United States Navy, Naval Dental School, National Naval Medical Center, Bethesda, Md.

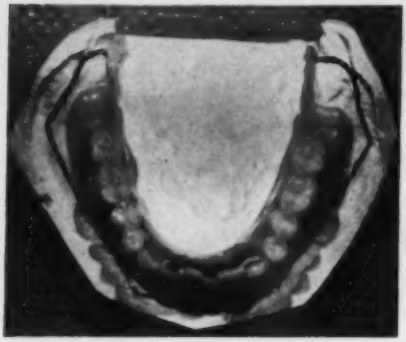

Fig. 1 • Typical underextended denture, superimposed over the tray outline recommended by Fisher

ency of laboratory technicians to trim impression or denture flanges, and a lack of space above the retromolar pad in those instances where the maxillary tuberosity infringes on it at the desired vertical dimension.

The base area of a denture is controlled by the extension of the impression tray and one certain way of achieving adequate coverage on the mandible is to use the method of outlining a tray which is recommended by Fisher.[1] A line is drawn across the back of the retromolar pad on the preliminary cast. This is connected to a line running forward on the external oblique line. A tray made to such an outline will preclude the construction of a denture such as the one shown in Figure 1.

Large and small dentures are not always the result of mouth conditions. Many dentures are too small as a result of methods employed by the operator. Since the buccinator and mylohyoid muscles frequently almost meet at the crest of the lower ridge, an underextended tray plus vigorous muscle trimming will cut the potential size of a lower denture base in half. There can be no such thing as little narrow lower dentures if trays are used which cover the retromolar pad and extend out to the external oblique ridge.

A second reason for mandibular underextension is the tendency of the laboratory technician to trim the flanges of impressions and finished dentures.

A third reason for underextension on lower dentures is a lack of space between the maxillary tuberosity and the retromolar pad. The dentures are ground through or cut short because there is too little room for bulky acrylic heels. If the space is limited, adequate coverage can frequently be obtained through the use of thin gold castings on either the upper or lower heels, as shown in Figure 2. Such castings allow the mandible to move into functional positions because they are less bulky than acrylic. If no space exists, surgical reduction of the tuberosity is indicated

Upper dentures, like lower dentures, also are most vulnerable to underextension in the posterior areas. The buccal flange of a denture should be thick if the

1. Fisher, R. D. Graphic interpretation of the structures influencing mandibular denture mucoperipheral outline form. J.A.D.A. 30:408 (March) 1943.

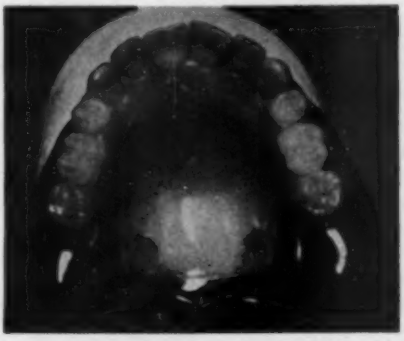

Fig. 2 • Showing the use of a thin gold casting when there is a lack of space between the retromolar pad and maxillary tuberosity. Similar single casting, with a finish line and retention loops, can be made to cover one or both of the retromolar pads and heels, if the space is limited

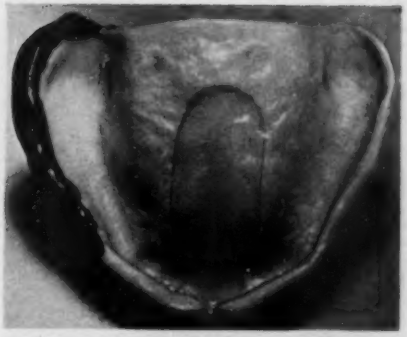

Fig. 3 • Shows the amount of compound needed to build this denture out to provide a peripheral seal. This addition also provides stability and bracing. Note the heavily beaded, overextended posterior border and the unnecessarily wide relief in the rugae area

mucobuccal fold is broad. Technicians should be instructed to maintain the roll of the impression on the finished denture. Their tendency is to finish dentures with thin buccal flanges and such treatment decreases the peripheral seal. Figure 3 shows the denture worn by a patient for three years who received an alcohol injection for tic douloureux. Following the loss of sensation on the right side, he was unable to keep it in place. Considerable tracing compound was added to build the denture out to its proper contour to provide a peripheral seal.

Underextension of the palatal border generally results from the operator's efforts to relieve gagging patients. Such short dentures are usually postdammed and sometimes the postdam rides on a hard area in the hard palate, keeping the denture from seating and thus nullifying efforts to gain a posterior seal. When a short denture is desired, the operator should determine a proper posterior extension in the following manner. Hold the patient's nose, have the patient blow out and then dot on or draw in the flexure line as the soft palate is forced downward. This line will be transferred to the impression and will give a minimum extension without underextension. A narrow groove in the cast at that extension will give a seal without interference from the underlying bone of the hard palate or muscles of the soft palate.

Faulty Postdams • Faulty postdams have several causes. Technicians frequently postdam casts in spite of the fact that postdamming is a chair operation which should be performed by the dentist while the patient is available for examination. The "ah," or vibrating line, can be determined only in the patient's mouth.

Osseous interference between the postdam and underlying bone frequently occurs on the posterior border of the areas marked "A," "B" and "C," as shown in Figure 4. Impingement of the dam on the area marked "A" causes distress because the denture border overlies the hamulus and its supporting structure, the medial plate of the pterygoid process. In old denture wearers this area is hard and unyielding and prominent. Impingement on the area "B" is also common. Dentures

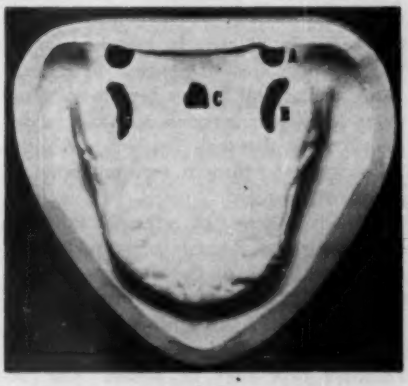

Fig. 4 • Area A overlies the hamulus which is frequently prominent in old denture wearers. Pressure on area B causes a complete loss of retention if B is unyielding. Area C is frequently hard, in which case the postdam should be shallow

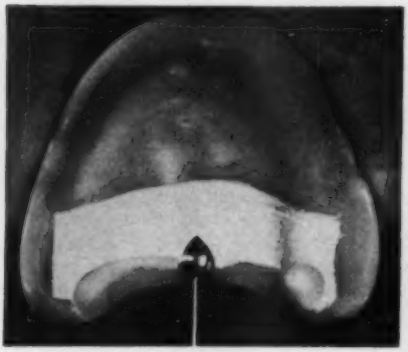

Fig. 5 • The adhesive tape keeps the postdam material where it is needed and furnishes a guide for trimming any excess which may have been applied

Fig. 6 • The dark area in the indicating wax shows the pressure area

with no retention at all generally are riding on the hard unyielding lingual margin of the tuberosity. Area "C" overlies the nasal spine which is occasionally hard and unyielding. Postdams should be narrow and shallow when they border on unyielding tissue and cannot be placed on these three areas.

Sometimes postdams are not heavy enough to provide a seal even when they are properly placed. In other instances the operator has to shorten a denture along the palatal border because of muscular or osseous interference, and in doing so loses the seal. In such cases the following procedure is recommended to correct the error.

Two thicknesses of adhesive tape are laid along the tissue-bearing surface of the palatal area of the denture, leaving exposed the area where additional material is desired. If additional depth is desired for a postdam another layer of adhesive tape may be added. The exposed area is roughened with a bur. Autopolymerizing acrylic is added to the roughened area and it is pressed firmly into place by holding a piece of wet cellophane against it with both thumbs for a few minutes. After 20 minutes the flash is trimmed off the adhesive tape with a vulcanite bur as shown in Figure 5. Through this procedure, the thickness of the material needed for additional postdam can be gaged and controlled. The adhesive tape is then removed and the edge of the new material is rounded off where it was butted against the edge of the tape.

Faulty Relief • Lack of relief is a common base area fault. Settling maxillary dentures frequently ride on tori or sutures which act as fulcrums and rock dentures loose. They are easily located by the use of indicating waxes and gels, as shown in Figure 6. Warm, soft gel is painted on the surface in question. The denture is seated and biting pressure applied. Disclosed pressure areas may be accurately relieved with a large bur. Indicating media are particularly valuable in locating spines under flabby anterior ridges and similar areas where pain is present but no inflammation can be seen clinically.

Overextension • Overextension can occur anywhere on the borders of a denture.

Some discussion of it appears in the sections on "postdam" and "phonetics." Occasionally a patient will complain that food packs in the buccal vestibule beside the lower molars. This may result from the use of narrow posterior teeth but more frequently it is the result of an overextended buccal flange. During the chewing cycle the tongue moves laterally and the contraction of the buccinator muscle forces the food lingually between the opposing molars. An overextended flange may tie the buccinator muscle down and limit its oscillations. Reduction of the flange border will correct the fault.

Overextension of the posterior border of the upper denture is common because the anatomy of the hard palate has not been sufficiently considered. The vibrating line, as determined by having the patient say "ah," varies with palatal muscles activity and the downward pitch of the soft palate. However, the underlying bone, to which the muscles are attached, exercises a powerful influence on the denture border unless the aponeurotic attachment between muscles and bone is long, and the soft palate very flat.

Many dentures cut straight across between the hamular notches and many more cut straight from the hamular notches to the fovea palatina, without regard for the "ah" line. These dentures are uncomfortable, loosen easily and interfere with speech. As the "ah" line is determined, the bony contours should be kept in mind because a majority of dentures should have a double scallop, conforming somewhat to the double scallop of the palatal bones.

Patients who blow wind instruments frequently have a retention problem in upper dentures. Regardless of the shape of the soft palate or the length of the aponeurotic attachment between palatal muscles and palatal bones, the denture should have the same short extension characteristic of dentures for gaggers and patients with sharply descending soft palates. Posterior extension should be determined by holding the patient's nose while he blows outward, as previously described. If the denture is extended onto movable tissue the posterior seal may be broken, as air pressure within the mouth blows the soft palate upward. A short denture, ending exactly at the flexure line, is not loosened because there is no tissue under it which can be displaced upward as the patient blows the instrument.

Dimensional Changes in Curing • Some warping of the entire denture base during the polymerization of acrylic resins is to be expected. However, a low temperature, nine-hour cure, should be used for repairs and relines to avoid warpage. Auto-polymerizing acrylic is recommended for tooth replacements and minor changes in dentures because it obviates warpage which may occur when a denture is heated.

FAULTY VERTICAL DIMENSION

Excessive vertical dimension is one of the most common denture faults and is something that the diagnosing operator should always check for a patient regardless of the apparent remoteness of complaints.

Correct vertical dimension should not be determined merely by the nicely contoured lips of the patient when the jaws apparently are in rest position or by the highest reading on a bite pressure dial. Neither should this dimension be determined only by a mark on a card as obtained from measuring rest position or by a reading on a device for measuring facial harmony. It is impossible to build dentures to a physiologically harmonious relationship on the basis of some single known fact as evidenced in a particular technic.

Vertical dimension should be a pattern of many factors. It means relaxed muscles, lips at rest, varying freeway space, harmony between the lower and middle thirds of the face, ability to speak without the biterims contacting, tongue room

Fig. 7 • If the anterior teeth are set normally and if the vertical dimension is correct, pressure such as this should impinge the lower lip on the maxillary central incisors when the patient's jaws are closed in centric occlusion. If the lip slides under the upper teeth, the vertical dimension is opened too far

for making the "th" sound, satisfaction of the patient's tactile sense and incidentally, the highest reading on a bite pressure dial, or a consistent rest position measurement on a card. With a pattern in mind the operator can use his own judgment.

There are two types of patients who need a freeway space far in excess of the two to three mm. generally recommended. The first is the patient who has been accustomed to occluding his teeth in a very overclosed relationship for a long period of time. The inadvisability of opening the vertical dimension of such a patient to the extent of 10 or 12 mm. in one operation has been frequently mentioned in dental literature. In such cases it is important to rely on the judgment of the patient, particularly when the patient is sure that a certain vertical dimension is correct.

The second type that needs an abnormally large freeway space is the mouth breather whose lower jaw has been in an opened relationship for a long period of time. Little attention should be paid to the rest position of such patients because the mandible is abnormally depressed. A freeway space of 3 mm. between the dentures of a mouth breather is inadequate. A tactile closure into soft wax is a better way to determine the vertical dimension of such patients.

It is important with these two types of patients that the operator does not try to get the proper vertical dimension by determining a rest position and then reducing that 3 mm. He should work to determine the vertical component of centric occlusion which fulfills the requirements of the case, without regard to the extent of freeway space.

One good check on vertical dimension is as follows, provided the patient's upper incisors are set in a normal position. The lower lip is pushed as shown in Figure 7 when the patient has his jaws in centric occlusion and the lip will impinge on the upper incisors. The lower lip is pushed when the patient has his jaws in a rest position and the lower lip will tend to slide under the upper incisors and impinge on the lower incisors instead. If the lip tends to slide under the upper incisors when the jaws are in centric occlusion, the vertical dimension is generally opened too far.

The appearance of the lower lip is frequently a clue to opened vertical dimension. As a general rule when moist, red and smooth mucosa shows on the lower lip when vertical dimension is being measured or a wax try-in is being checked, the vertical dimension is generally opened excessively.

The "th" sound is the most reliable phonetic cue to correct vertical dimension. When the patient says words beginning with "th" his tongue should pop forward between the biterims. If the vertical dimension is excessive, the forward movement of the tongue, between the wax rims or setup teeth, is restricted by the height of the lower wax rim or teeth. If the tongue cannot move forward for the "th" sound, the relationship should be opened.

Lines in the face should be corrected by bulk and contour of the flanges and by the position and inclination of the teeth, but never by opening the bite beyond physiologic limits. There are many simple tests for opened vertical dimension and they all can be used in a minute or two. Opened vertical dimension is a serious and common denture fault. Its source is frequently in the laboratory.

FAULTY OCCLUSION AND ARTICULATION

The predominant part played by faulty occlusion in the failure of full dentures needs no emphasis because dental literature has covered this subject thoroughly, but a review of the causes of faulty occlusion is important. Among these causes are:

1. Improperly stabilized baseplates.
2. Shifting baseplates caused by resilient tissue.
3. Inequalities in the softness of wax used in obtaining jaw relationship records.
4. Interfering baseplates.
5. Faulty articulators and articulator mountings.
6. Faulty setups.
7. Wax warping.
8. Tooth movements in the flask.
9. Dimensional changes in curing.

These are important because they radically affect the choice of corrective measures.

In the first place, occlusal faults cannot be detected visually in the mouth consistently nor can they be corrected solely by the use of articulating paper or milling paste because dentures shift as soon as a premature contact is made by opposing tooth surfaces. Shifting dentures lead the operator to believe that the occlusion is satisfactory when in reality it may be poor.

Secondly, a laboratory remount is inadequate. The remounting of the models on the articulator to original mountings, following processing, before the dentures are removed from the casts, corrects only the errors which occurred during and after the setup. The adequacy of that technic would be based on the premise that all procedures, before the setup, were perfect. A review of the causes of occlusal error together with a knowledge of modern laboratory procedures invalidates any assumption of a perfect technic, up to the setup stage.

Obviously, the only method which would correct all of the cumulative occlusal errors would have to be undertaken after the dentures are inserted and completely seated. This can be done by remounting the dentures from the patient's mouth to an articulator using a new centric jaw relationship and new eccentric records. For this technic to be of value, an adjustable articulator should be used and since many dentists do not use an adjustable articulator, this method has no universal application.

The best alternative for general use seems to be to correct occlusion in the mouth, using some technic which will limit the shifting of dentures under premature cuspal contact. For this purpose a central bearing device with a spring pin is recommended. It can be installed in the dentures in a few moments. Under light spring tension the upper denture is held up and the lower denture is held down as shown in Figure 8. Premature contacts do not shift the dentures and articulating paper can be used with great accuracy.

This method, both simple and accurate, appears to be well suited to the needs of the practitioner who does not use an adjustable articulator. Faulty centric relationship, premature contacts of teeth in centric occlusion and cuspal interferences in eccentric movements are undoubtedly the greatest single cause of denture failures. Most of the pain and looseness of dentures is directly traceable to occlusal faults. The central bearing spring pin is a

practical means of correcting these faults.

Here in a discussion of occlusal correction is an example of the fallacy of trying to use a single technic to accomplish a phase of full denture work in all types of mouths. Trapozzano's investigations[2] and practical experience bear out the fact that the central bearing pin is not completely reliable in a mouth which is flabby. Also, the central bearing pin mounting crowds the tongue and if the lower ridge is very flat or the patient's tongue large and awkward, a lower denture can easily be pushed forward and lead the operator to believe mistakenly that the denture was built in a slightly protruded position. So, like the other technics mentioned, the central bearing pin method of correcting occlusion has its limitations.

Errors in basic planning also contribute to occlusal difficulties.

Faulty occlusion is frequently found in instances where single full dentures oppose arches of natural teeth. Even a well formed, smooth and uninterrupted arch appears suddenly rough when the technician begins to set artificial teeth against a cast of natural teeth. Dentures which oppose natural dentitions generally pound ridges because of occlusal discrepancies. The recognition and elimination of points of potential interference is essential. Study models should be made of the natural arch. Ragged incisors should be smoothed and reduced incisally. The distal cusps of mesially inclined molars should be reduced to decrease the curve of Spee. Cuspal height should be reduced to decrease lateral thrusts. Teeth in buccoversion or labioversion should be reduced toward the lingual. What appears to be ruthless grinding is eventually a method of conservation.

Occlusal correction can be accomplished in the mouth using articulating paper as a guide because a single denture can be supported by the operator's finger tips, thus preventing tilting when premature contacts are made. The correction should provide correct articulation over a wide lateral range. This need for wide occlusal freedom is interesting in view of Kurth's[3] observations in connection with the unimportance of the "glides." These "glides," or typical articulator movements involving a forward movement of the condyle on the balancing side during function, are said by Kurth to play no part in actual chewing. Still, if correct articulation is not provided for single full dentures in those positions involved in the glide, (that is, where one or the other of the condyles is in a pro-

2. Trapozzano, V. R. A comparison of the equalization of pressure by means of the central bearing point and wax check bites. J.A.D.A. 38:586 (May) 1949.

3. Kurth, L. E. Mandibular movements in mastication J.A.D.A. 29:1769 (Oct.) 1942.

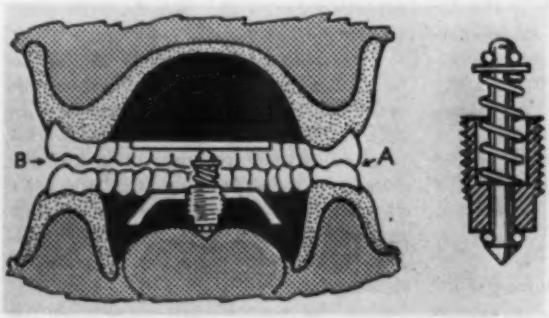

Fig. 8 • When a premature contact is made at point A, the central bearing spring holds the upper denture up and the lower denture down. Articulating paper can be used on side A for the correction of occlusion. No marks will be made on side B if the spring pin is used

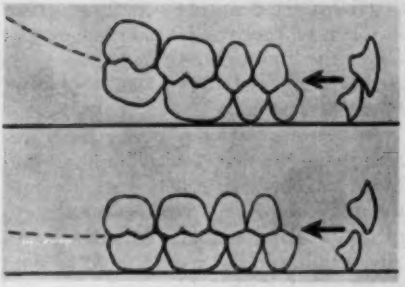

Fig. 9 • Above: Cusp height and arrangement needed to provide balance with a steep incisal guidance. Below: Cusp height is lessened and occlusal plane more nearly parallel to mean plane of the ridges when a flat incisal guidance is used. This setup tends to keep forces in a vertical direction

truded position) the patient will knock a single denture loose and complain of discomfort.

Swenson[4] recommends the use of abrasive paste in the mouth for the final occlusal correction of single full dentures.

Many occlusal faults are directly traceable to the incorporation of vertical overlap of the incisors with insufficient horizontal overjet. Figure 9 shows the effect of a steep incisal guidance on the cuspal inclines of posterior teeth as a balanced occlusion is achieved. The steep posterior cusp inclines which accompany vertically overlapped anterior teeth in balanced occlusion may be reflected in the choice of posterior teeth, in the compensating curve used in the setup, or in the angulation of the plane of orientation. Steep cuspal inclines are potential hazards and it is of clinical interest that many laboratory men use articulators which have fixed incisal guides that are steep.

In view of the fact that initial occlusal errors are common and that occlusal discrepancies result when dentures settle, it is a dangerous procedure to use excessive vertical overlap of the incisors. The cuspal inclines, resulting from such a setup direct the forces pattern away from the mean plane of the supporting ridges. The harmful effect of an occlusal error is in direct proportion to the steepness of the cusp because the resultant of a force applied to a cusp is at right angles to the cuspal plane. The steeper the plane, the more nearly horizontal becomes the resultant of the force and horizontal forces are undesirable.

Tightly locked anterior occlusion is a frequent sequel to immediate dentures because the technician generally sets anterior teeth in the original position of the natural teeth. Regardless of the esthetic effects, these tooth positions should be changed in the dentures to allow for clearance of the anterior teeth. The contact of anterior teeth in centric occlusion and their interference in functional positions are common causes of denture failures.

When patients have lost their posterior teeth, the remaining teeth are frequently in a slightly protruded relationship, so when immediate dentures are made, the occlusion of the anterior teeth should not be considered a reliable guide in the establishment of centric jaw relationship.

FAULTS IN GROSS CONSTRUCTION

Articles have been written on the importance of eliminating the frequently encountered convexities from all flanges, and particularly from the lingual surface of the lingual flange of the lower denture. A flat or concave lingual flange increases tongue room, improves speech, decreases gagging and allows the tongue

4. Swenson, M. G. Complete dentures, ed. 2. St. Louis, C. V. Mosby Co., 1947.

to stabilize the denture by cradling against it. Slightly concave buccal flanges also allow the buccinator muscle to cradle against, and to stabilize, both upper and lower dentures.

The wrong size of posterior tooth frequently is chosen for a replacement. Many textbooks state that posterior teeth should be chosen by measuring the length of the posterior mandibular ridge. Actually, small posterior teeth should be used to offset poor supporting structures and unsatisfactory ridge relationships, regardless of the length of the span to be replaced. Obviously, a small tooth will penetrate a food morsel with less force than will a large tooth. By limiting loads through the use of small posterior teeth, one limits the forces which tend to displace dentures. It is difficult to justify the tendency to replace lost posterior teeth with the same size teeth and the same number of teeth. Smaller and fewer teeth should be used on dentures and members of the laboratory craft must be educated to accept this. They should be given verbal or written laboratory instructions.

Porcelain teeth are much more efficient than acrylic teeth and are better in difficult cases where supporting structures need to be protected. Also, posterior teeth which have been ground in occlusal correction should be sluiced freely by deepening the buccal grooves to provide egress for macerated food. Patients are quick to notice and appreciate the improved efficiency resulting from sluicing teeth which have been ground flat.

Posterior tooth arrangement is frequently wrong. Just as the technician hesitates to use an unconventional size or number of teeth on dentures, he hesitates to use an unconventional arrangement. More teeth should be set in a crossbite position in order to keep the force pattern in a vertical direction. The upper ridge crest moves medially following the extraction of teeth and the lower ridge crest moves laterally as resorption of bone takes place. The need for crossbiting teeth is apparent in many instances.

When anatomic teeth are set in crossbite position, it is important that certain changes be made in cuspal topography to smooth out the articulation. The use of an adjustable articulator facilitates the making of these changes. If an adjustable articulator is not used, it appears that flat teeth are better for crossbite positioning because they allow more latitude in the setup and in function. Here again, the importance of precise laboratory instructions as a means of obtaining desired results in denture construction can be seen because the technician is loathe to depart from traditional tooth arrangements.

FAULTY PHONETICS

It is easy to theorize about the factors in denture construction which influence speech but the practical application of these theories is difficult. In the first place, while speech imperfections are easily noticed, it is not easy to ascertain what the imperfection is. Secondly, since it frequently takes patients from two to three weeks to accustom themselves to dentures, it is difficult for the operator to judge the seriousness of the speech imperfections exhibited by the patient with wax try-ins or newly delivered dentures.

There are, however, some facts about problems of speech of a patient with dentures that should be remembered. These are:

1. Patients are adaptable and generally will correct speech difficulties within two or three weeks, so most patients can be assured that they will get over their troubles.

2. Enunciation of the letter "s" is the most common speech defect associated with full dentures. Associated with such a difficulty is involuntary hissing. This may be caused by any of the following reasons. The rugae area of the denture may be too thick or too thin or the ante-

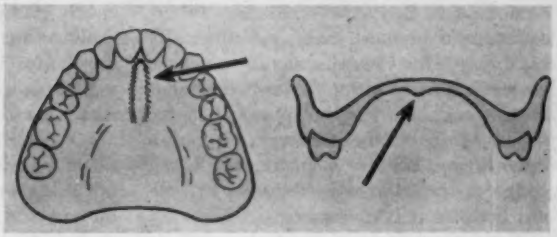

Fig. 10 • Full view and cross section of median line ridge employed to improve the enunciation of the letter "s"

rior teeth may be set too far lingually. If the anterior maxillary ridge is heavy and the denture thick, the rugae area probably should be thinned to provide more space for the escape of air. If the anterior ridge is small and the denture base thin, it is likely that there is too much air escaping between the tongue and the denture. In this case additional wax on the palatal surface should correct the trouble. Following such verification, auto-polymerizing acrylic may be added for permanent correction. If the anterior teeth are set too far lingually, they must be reset or correction possibly can be made by heavy festooning on the denture just lingual to the anterior teeth.

Sometimes, if these remedies do not correct the defect, a median ridge as shown in Figure 10 will help. It works in two ways. If there is too much space between the tip of the tongue, and the rugae area, the ridge fills part of the cleft on the top of the tip of the tongue, thus decreasing the escape of air. If there is too little space, the ridge provides a tactile reminder to the tongue and that organ withdraws enough to permit proper egress of air. A whole system of rugae, as sometimes advocated, does not perform these functions and generally is not an aid to proper enunciation.

3. The pronunciation of the letter "f" is an aid in properly locating the position of the upper incisors. When words beginning with "f" are pronounced, the lower lip should contact the edge of the upper incisors. If the lower lip does not contact the upper incisors during the "f" sound, these teeth should be repositioned.

4. The "th" sound is the most intimately connected with proper vertical dimension as has been previously mentioned.

5. Lack of tongue room posteriorly may make it difficult for patients to speak clearly.

6. Overextension of the upper denture onto the soft palate results in speech difficulties, possibly because the patient must make a conscious effort to keep such a denture in position when he is talking.

FAILURES CAUSED BY PHYSIOLOGIC PROCESSES

Dentures do not always fail because of mechanical faults. The physiologic processes of the patient are frequently a factor.

One example of this is the effect of body weight loss on the fit of dentures. When a patient loses 15 pounds of weight, he is not surprised when his clothes do not fit. Generally his dentist has to tell him that his dentures may be similarly affected.

Alveolectomies which involve the removal of cortical bone should be discouraged because nature's reaction to such treatment is erratic. Some ridges which have suffered the loss of the cortical plate retain their bulk but more commonly there is progressive loss of remaining structures. Many times it is advisable to underextend flanges in pref-

erence to reducing overhanging tuberosities, and at most, only one tuberosity need be reduced because dentures can be rotated into position. When esthetics require a choice between removal of the labial plate or the construction of an open-face maxillary denture, the latter course is advisable as a temporary expedient because it conserves cortical bone.

Patients suffering from diabetes or periodontal disease are subject to a rapid loss of supporting structures when dentures are inserted and it is important that they be forewarned of this probability. Only if they realize that they will need frequent refittings, will they be satisfied with their full denture service.

No comments on denture failures would be complete without a reference to malignant growths as nothing insures failure with such finality as undetected carcinoma. Undoubtedly, the frequent occurrence of denture cuts and ill-formed ridges lulls the dentist into a sense of security which is unjustified. A lesion of over two weeks' duration which shows the following characteristics should cause suspicion of carcinoma.

1. Induration.
2. Progressive growth.
3. Tendency to ulcerate.
4. Lack of pain unless secondarily infected.
5. Infiltration of normal tissue (meaning a spreading attachment as opposed to a lesion which can be lifted free of underlying tissue).

Leukoplakia is sometimes a forerunner of carcinoma and it is frequently encountered by the full denture prosthodontist. Most pathologists agree that leukoplakia may be improved when covered by a denture but they add that it should be observed every few weeks and that it should be biopsied if it becomes deeply furrowed or hemorrhagic. It is not desirable to reproduce the keratose corrugations of leukoplakia on the base area of a denture. The roughness should be lightly erased with a Kingsley scraper or similar instrument, prior to delivery of the denture.

The placing of dentures over areas which have received heavy radiation is not a good procedure because irradiated tissue has diminished vitality and does not react well to trauma. A denture cut may expose underlying bone, giving rise to radiation necrosis of the bone. Dentures should be cut short and kept free of irradiated areas and should be built to fulfill esthetic and not mechanical needs. Frequently such patients have nonproductive salivary glands because of radiation. Their ability to masticate food is so limited that they do not place heavy demands on their dentures.

ADVICE TO THE PATIENT

There are patients who have denture problems which cannot be solved to their complete satisfaction. Only by early recognition of problems, and adequate preoperative mental preparation can the prosthodontist hope to have a satisfied patient. The patient should be made to realize his limitations before treatment is begun.

Also, the patient should receive additional advice when his dentures are delivered because such instructions may be the deciding factor between success and failure. There are certain tricks to wearing dentures and these should not be left to the patient's ingenuity to discover. He may be instructed as follows:

1. Push inward and upward when biting such foods as apples and carrots.
2. Tighten the corners of the mouth against the lower flange when the mouth is opened wide.
3. Endeavor to masticate with an up and down motion, using a minimum of lateral excursion.
4. Keep the tongue low and well forward in the mouth to stabilize the lower denture.

5. Close, suck and swallow frequently when first wearing dentures because such action seats the dentures firmly.

Two helpful publications which may be given to a patient to read are *Visual Education for the Denture Patient*[5] and *New Teeth for Old* by Victor Sears.[6]

CONCLUSIONS

Failures of full dentures generally stem from the following causes:

1. Faulty base areas.
2. Faulty vertical dimension.
3. Faulty occlusion.
4. Faults in gross construction.
5. Faulty phonetics.
6. Certain physiologic processes of the patient.
7. Inadequate advice to the patient.

If the operator is well acquainted with these pitfalls he will apply this knowledge to advantage in diagnosis and case planning; in his technical procedures; in his relations with the laboratory technician; in the delivery of dentures and in his evaluation of a patient's complaints.

The prosthodontist can use a mental catalog of denture faults to great advantage in a full denture service.

4318 Kentbury Drive

5. Burtenshaw, G. H. Visual education for the denture patient. New York, Distributed by Dental-Patient Education Film Co., 1948.

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Revolution in Scientific Thought • If one were asked to put a pin in a chart of human progress showing its mid-point it would probably be inserted at about 1800 A.D. I feel sure that if my great-great-grandfather who practiced in Maryland were to make rounds with Imhotep in ancient Egypt four thousand years ago, the contrast would be far less than if he had done so with me. A revolution in human conduct had occurred. Skepticism, since man emerged from the ape, looked upon as a fault, suddenly became a virtue, and for the scholar the prime virtue. Past ages had produced their Galileos, Tycho Brahes, da Vincis, but today we are all of us potential intellectual giants through the inspiration of these men, if only we have the courage to abide by their rules of thought. It only takes a short attendance at any scientific meeting to prove that many physicians have not done this, but the same tests always show that those who have are legion. *Edmund Andrews, A history of scientific English, p. 263.*

Enamel penetration by radioactive salts of zinc, calcium, silver, plutonium, palladium and copper

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Many therapeutic technics in dentistry depend upon a penetration of medicaments into tooth structure. In some cases the extent of penetration is known because of the color of the agent; for example, dyes and silver nitrate. Little is known, however, of the depth of penetration of uncolored medicaments. If these penetrate to any considerable extent an additional explanation can be offered not only for the unexpected pulpal irritations following application of medicaments but also for the familiar hypersensitivity of dentin following exposure to oral fluids.

Of vital concern to the dentist is the mechanical and chemical efficiency of impregnation of enamel lamellae with zinc salts. Thus far knowledge of the penetration of $ZnCl_2$ beneath the surface of the enamel and its precipitation as zinc ferrocyanide as claimed for the impregnation procedure rests on three indirect observations:[1] (1) Zinc ferrocyanide is supposed to penetrate enamel lamellae because silver nitrate does; the latter can be followed because of the black color developed by its reduction to metallic silver. (2) The sensitivity of root surfaces can be reduced by the application of $ZnCl_2$. (3) Recent clinical reports indicate that impregnation with zinc ferrocyanide may reduce caries incidence.[2,3] Direct evidence is not available to show that the colorless salt zinc ferrocyanide is precipitated in the enamel lamellae or that it remains there.

The penetration of medicaments and various salts can be studied since they are available in the radioactive form.[4,5] Tests were made on extracted teeth with radioactive calcium chloride, zinc chloride, silver nitrate, plutonium citrate complex, palladium chloride and copper nitrate.

CALCIUM^{45} CHLORIDE

Seven freshly extracted teeth were treated on the surface with about 0.02 ml. of a $Ca^{45}Cl_2$ solution with an activity of 126 microcuries per milliliter. Descrip-

Based on work performed under U.S. Government Contract No. W-7405-Eng-36 with the Los Alamos Scientific Laboratory of the University of California. The following radioisotopes were obtained on allocation from the Isotopes Division of the United States Atomic Energy Commission: Ca^{45}, Zn^{65}, $Ag^{110,111}$ and Pd^{109}.

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Table 1 • Penetration of dental structures by radioactive calcium[45] chloride

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of longitudinal section	Caries	Lamellae	Fissures
101	Lower left third molar	21	Pericoronitis malposed	611	Labial third	−	+	−
				613	Middle third	+	+	−
102	Upper left first bicuspid	37†	Periodontosis	614	Buccal third	+	+	−
				616	Middle third	+	−	−
103	Upper left second bicuspid	37†	Periodontosis	617	Buccal third	−	−	−
				618	Lingual third	+	+	−
				619	Middle third	+	+	+
104	Upper left first molar	37†	Periodontosis	620	Outer buccal quarter	−	+	−
				621	Outer lingual quarter	+	−	+
				622	Inner buccal quarter	+	+	+
				623	Inner lingual quarter	−	−	−
105	Upper right central incisor	36‡	Preparation for denture	624§, ‖	Mesial third	+	−	−
				626	Middle third	+	+	−
106	Upper left central incisor	36‡	Preparation for denture	627‖	Mesial third	+	−	−
				628#	Distal third	+	+	−
				629	Middle third	+	−	−
107	Upper right lateral incisor	36‡	Preparation for denture	630	Mesial third	−	−	−
				631§	Distal third	+	+	−
				632	Middle third	+	+	+

* All teeth showed strong surface uptake of $Ca^{45}Cl_2$ on enamel and cementum. Intact enamel was not penetrated but all carious areas and fissures were penetrated. All lamellae seen were penetrated.

† Patient S. G.

‡ Patient C. C.

§ Silicate filling free of $Ca^{45}Cl_2$ after four hours under running tap water. Dense uptake in stained dentin surrounding filling.

‖ Dentoenamel junction penetrated from gingival margin.

Silicate filling and surrounding stained dentin densely penetrated.

tions of the teeth and specimens are outlined in Table 1.

Immediately after extraction tooth 101 was scrubbed, pumiced, washed, dried, NaF applied to the surface and allowed to dry for three minutes. Nine minutes after extraction $Ca^{45}Cl_2$ was applied to the surface of the crown. It was kept moist for three minutes and then wrapped in absorbent paper. One hour later it was washed under running tap water for 30 minutes, sectioned under water and dried overnight at 37°C.

Tooth 102 was similarly treated except that it was not pumiced, and the isotope was applied 58 minutes after extraction.

Tooth 103 was treated like Tooth 101 except that NaF was not used, and the isotope was applied 61 minutes after extraction.

Tooth 104 was treated like tooth 101 with the exception that the isotope was

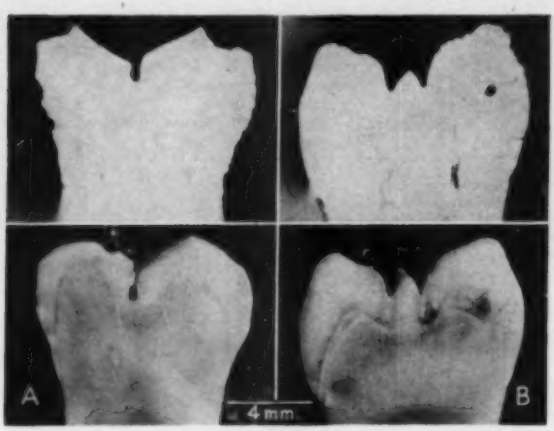

Fig. 1 • A: Dense surface uptake of $Ca^{45}Cl_2$. Intact enamel not penetrated. Faint penetration of two cracks in mesial cusp; dense penetration of carious enamel and carious fissure. (Spec. 620, Neg. 15470; R.A.-723, Neg. 15471.) B: Dense surface uptake of $Ca^{45}Cl_2$. Faint penetration of enamel lamella on mesiogingival. Intact enamel not penetrated. (Spec. 611, Neg. 15486; R.A.-717, Neg. 15485)

applied 65 minutes after extraction.

Teeth 105, 106 and 107 received similar treatment to tooth 101 except that they were pumiced and NaF applied prior to extraction. The isotope was applied 13 minutes after extraction and the teeth were sealed moist in a bottle overnight. The next day they were washed under tap water for four hours and dried overnight at 37°C. Tooth 105 was dehydrated in alcohol and embedded in Selectron.[6]

The radioactivity of the sections was counted in a constant position 1 mm. from a mica window tube (2 milligrams per square centimeter, TGC-2) with a Tracerlab laboratory monitor and ranged from 140 to 2,500 counts per minute.

Survey radioautographs[7] were made; the findings are surveyed in Table 1. Typical radioautographs and the corresponding specimens are illustrated in Figures 1, 2 and 3.

All of the teeth showed a strong surface uptake of Ca^{45}, as seen in the radioautographs in the upper portions of the figures. The NaF treated teeth did not differ in this respect from the untreated teeth. Every carious defect was penetrated to the grossly visible limits of the lesion regardless of whether the tooth had been cleansed or not. Each tooth, although kept moist until the time of isotope application, was carefully dried with air blast just before applying the $Ca^{45}Cl_2$. All fissures were penetrated.

Figure 1, A illustrates a tooth in which there is a dense surface uptake of Ca^{45} not removed by 30 minutes of washing. All surface defects (cracks, fissures and carious lesions) were penetrated. The radioautograph of Figure 1, B shows exactly the same findings with the addition of lamellar penetration of the mesiogingival enamel. Figure 2, A shows the same findings but the number of enamel cracks is much greater and there is considerable penetration along the dentoenamel junction from the labiogingival surface. This tooth had carried a partial veneer crown for years. It would be of interest to know whether the manipulations incident to crown preparation were the source of the cracks and subsequent permeation of the enamel by dissolved substances.

Figure 2, B shows the radioautograph of a tooth in which the pulp chamber had

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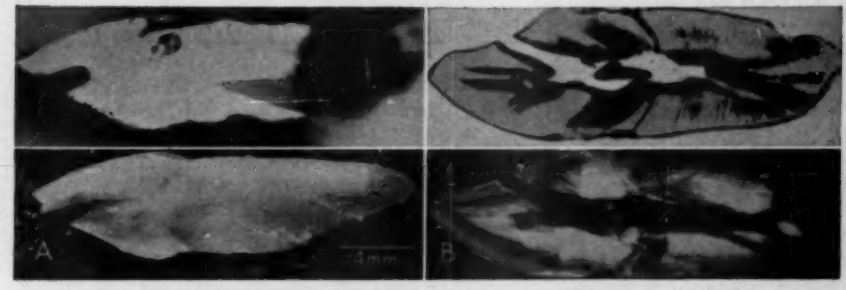

Fig. 2 • A: Dense surface uptake and dense penetration of enamel cracks by $Ca^{45}Cl_2$. Penetration along dentoenamel junction from labiogingival. (Spec. 627, Neg. 15482; R.A.-801, Neg. 15481.) B: Dense surface uptake with penetration of incipient caries of labial enamel, exposed incisal dentin, and linguogingival enamel. The dentin is extensively penetrated from the open pulp chamber. (Spec. 626, Neg. 15479; R.A.-795, Neg. 15478)

been opened. Although the isotope was applied to the surface and no special effort was made to introduce it to the pulp chamber there is great penetration of all of the surrounding dentin. In spite of four hours of washing under running tap water the Ca^{45} was fixed in the tooth. $CaCl_2$ is an extremely soluble compound so the Ca^{45} must be considered to have been taken up by the apatite crystals of the calcified substance by ionic exchange.[8] In addition to the dense surface uptake there is penetration of enamel caries, exposed incisal dentin and a lamella in the linguogingival enamel.

Figure 3, A shows a radioautograph from a distal section of the same tooth as in Figure 2, A. The findings are similar with the exception of the silicate cement filling. The cement has been penetrated completely by the isotope and has retained the Ca^{45} throughout its structure

8. Neuman, W. F. Bone as a problem in surface chemistry. University of Rochester unclassified document, UR-110, March 22, 1950.

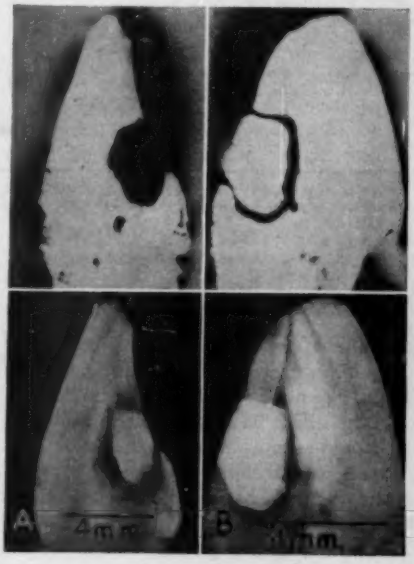

Fig. 3 • A: Dense surface uptake of $Ca^{45}Cl_2$ with penetration of exposed incisal dentin, cervical enamel and cementum defects. Dense uptake by silicate cement filling and stained dentin of cavity floor. (Spec. 628, Neg. 15473; R.A.-727, Neg. 15472.) B: Dense surface uptake of $Ca^{45}Cl_2$ with penetration of cervical enamel defects. Faint penetration of lingual enamel crack near incisal edge. Silicate cement filling shows freedom from $Ca^{45}Cl_2$; underlying stained dentin shows dense retention of $Ca^{45}Cl_2$ in a band surrounding the filling and extending to the surface. (Spec. 630, Neg. 15398; R.A.-797, Neg. 15480)

Table 2 • Penetration of dental structures by radioactive zinc[65] chloride

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of section	Caries	Lamellae	Fissures
113	Upper left third molar	22	Malposed	649	Transverse midcrown	+	−	+
				650	Transverse cervical	−	−	−
114	Upper right second molar	49†	Periodontosis	651	Transverse midcrown	+	−	−
				652	Transverse cervical	+	−	−
115	Upper right first molar	49†	Periodontosis	653	Transverse midcrown	+	−	−
				654	Transverse cervical	+	−	−
116	Upper right central incisor	30‡	Periodontosis	655	Transverse midcrown	+	−	−
				656	Transverse cervical	−	−	−
117	Upper left cuspid	30‡	Periodontosis	657	Transverse midcrown	+	−	−
				658	Transverse cervical	+	−	−
118	Upper right cuspid	30‡	Periodontosis	659	Transverse midcrown	−	−	−
				660	Transverse cervical	−	−	−
119	Upper right lateral incisor	30†	Periodontosis	661	Longitudinal labial half	+	−	−
				662	Longitudinal lingual half	+	−	−
120	Upper left central incisor	30‡	Periodontosis	663§	Transverse midcrown	+	−	−
				664	Transverse cervical	−	−	−

* All teeth showed strong surface uptake of $Zn^{65}Cl_2$ on enamel and cementum. Intact enamel was not penetrated but all carious areas and fissures were penetrated.

† Patient S. H.

‡ Patient E. H.

§ Silicate filling penetrated with $Zn^{65}Cl_2$ to the dentin.

in spite of four hours of washing under running tap water. In addition to the silicate cement the stained dentin bordering the filling has also retained the Ca^{45}. It would seem that in life this filling was porous to oral fluids and that the underlying dentin was exposed to the action of oral fluids.

The tooth in Figure 3, B is from the same mouth as those of Figures 2 and 3, A; it shows similar dense surface uptake and penetration of enamel defects. The silicate cement filling in this case, however, did not retain the Ca^{45}. Why this filling should behave differently from that of Figure 3, A is not known. The stained dentin and enamel bordering the filling, however, has again retained the Ca^{45} not-

withstanding four hours of washing under running tap water.

RADIOZINC CHLORIDE (Zn^{63}, Zn^{65})

Twenty-two teeth were treated with radiozinc according to Gottlieb's instructions[1] except that all but five of the teeth were not pumiced. The teeth which were pumiced are: 136, 137, 138, 139 and 142. All of the teeth were benzene washed except 140, 141 and 148 through 154. All teeth were dried in air blast before the application of $ZnCl_2$. The time from extraction until application of the isotope varied from eleven minutes to two hours; the time for teeth 136, 137, 138 and 139 was between seven and ten minutes; for 113, 114, 115, 140, 141, 142 between 22 and 35 minutes; for teeth 116, 117, 118, 119, 120 between 56 and 67 minutes; 150 through 154, 95 minutes; 148 and 149, two hours. After the application of zinc ferrocyanide all teeth were washed for one hour under running tap water. With the exception of teeth 113 through 120, all teeth were immersed in $AgNO_3$ for at least five minutes and then in 10 per cent Formol for at least five minutes.

The $Zn^{63}Cl_2$ was prepared from a copper target by cyclotron irradiation and added to commercial Zin-Ferro No. 2 solution. The activity of the solution and the activity of the specimens were not determined. The teeth treated with Zn^{63} are described in Table 2.

The teeth described in Table 3 were dehydrated in alcohols and embedded in Selectron. All teeth were sectioned under water.

The teeth described in Table 3 were treated with Zn^{65}. Teeth 136 through 142 were treated with a solution of $ZnCl_2$ prepared by adding 0.010 ml. of a $Zn^{65}Cl_2$ solution containing 18.75 millicuries per milliliter to 10 ml. commercial Zin-Ferro No. 2 solution. The specimens varied in activity from 100 to 300 counts per minute. Teeth 148 through 154 were treated with the undiluted $Zn^{65}Cl_2$ solution containing 18.75 millicuries per milliliter; the activity of the specimens was not determined.

The structures penetrated are summarized in Tables 2 and 3. All teeth showed a surface uptake of radioactive $ZnCl_2$ which was not removed by washing. Intact enamel was not penetrated but all enamel defects, carious areas, fissures and observable lamellae were penetrated.

Typical radioautographs are shown with the respective specimens in Figures 4, 5 and 6. The dense surface uptake with penetration of minute surface carious lesions and lack of penetration of intact enamel is seen in Figure 4, A. Figure 4, B is similar but with penetration of carious lesions extending to the dentoenamel junction. Figure 4, C also shows penetration of lamellae in thicker enamel. Figure 5 shows similar findings with complete penetration of carious lesions of the enamel and outer layers of dentin.

Figure 4, B and C and Figure 5 do not show complete plugging by zinc ferrocyanide since the silver nitrate stained the same lamellae and defects. In Figure 6, A, however, the arrow marks a buccal lamella which appears in the middle radioautograph but not in the specimen. The system of cracks and fissures connected with the lingual surface also shows lines of zinc penetration in the radioautograph which did not stain in the specimen. Although this apparently provides an instance of plugging by zinc ferrocyanide it is not conclusive. The upper radioautograph of Figure 6, A (exposure time one hour) shows the usual surface uptake and penetration of carious lesions and fissures. The middle radioautograph (exposure time seven and a half hours) shows more detail in the less radioactive areas.

Figure 6, B shows surface uptake by enamel, cementum and the amalgam filling. The radioactive $ZnCl_2$ has penetrated the carious enamel and dentin

Table 3 • Penetration of dental structures by radioactive zinc[65] chloride

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of section	Caries	Lamellae	Fissures
136	Upper left second molar	40	Periodontosis	701	Longitudinal buccal third	+	−	−
				703	Longitudinal middle third	+	−	+
137	Upper left first molar	41	Periodontosis	704	Longitudinal buccal third	+	−	+
				705	Longitudinal lingual third	+	−	+
				706	Longitudinal middle third	−	+	−
138	Lower right second bicuspid	38	Pathologic exposure	708	Longitudinal lingual third	+	−	−
				709	Longitudinal middle third	+	−	−
139	Upper right first molar	16	Total pulpitis	712	Longitudinal buccal cusp	+	−	−
140	Upper left first bicuspid	34	Pulpitis	715	Transverse midcrown	+	+	−
				716	Transverse cervical	+	+	−
141	Lower left first molar	21	Pulpitis	718	Transverse cervical	+	−	−
142	Lower left first molar	41	Periodontosis	719	Transverse midcrown	+	+	−
				720	Transverse cervical	−	−	−
148	Upper right first bicuspid	49†	Periodontosis	736	Transverse cervical	−	+	−
149	Upper right second bicuspid	49†	Periodontosis	737	Longitudinal mesial half	+	−	−
150	Upper right second molar	28	Caries	739	Transverse midcrown, buccal half	+	−	−
				740	Transverse midcrown, lingual half	+	−	−
				741	Transverse cervical	+	+	−
151	Lower right deciduous first molar	7‡	Pathologic exposure	742	Transverse midcrown	+	+	+
				743	Transverse cervical	+	+	−
152	Lower right deciduous second molar	7‡	Pathologic exposure	744	Transverse midcrown	+	+	−
				745	Transverse cervical	+	+	−

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of section	Caries	Lamellae	Fissures
153	Upper left third molar	34	Caries	746A	Transverse midcrown	+	+	−
				746B	Transverse midcrown	+	+	−
				747	Transverse cervical	+	+	−
154	Upper right first molar	42	Pulpitis	748	Transverse midcrown	+	−	−
				749	Transverse cervical	+	−	−

* All teeth showed surface uptake of $Zn^{65}Cl_2$ on enamel and cementum. Intact enamel was not penetrated but all carious areas and fissures were penetrated. All lamellae seen were penetrated.
† Patient S. H.
‡ Patient R. P.

completely around the filling. There is a more dense uptake on the surface of the exposed cervical dentin on the buccal surface.

Figure 6, C is of interest because the radiozinc has apparently penetrated the metamorphosed dentin more uniformly than the silver nitrate. The latter failed to penetrate in a series of broad stripes. The zinc appears to have penetrated enamel a third of the way down from the cusp.

RADIOSILVER NITRATE (Ag^{111}, Ag^{110})

Ten teeth were treated with radioactive silver nitrate. In this form there was an opportunity to compare visual perception

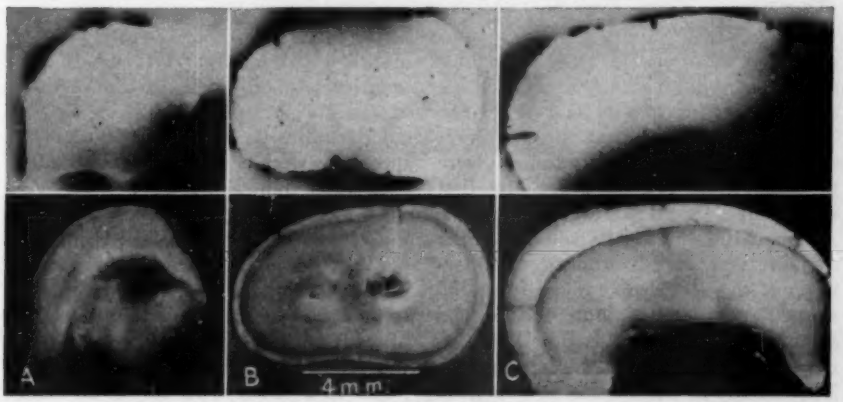

Fig. 4 • A: Dense surface uptake of $Zn^{65}Cl_2$ with penetration of carious dentin. Intact enamel not penetrated. (Spec. 739, Neg. 15368; R.A.-A343, Neg. 15339.) B: Dense surface uptake of $Zn^{65}Cl_2$ with penetration of enamel defects and lamellae. Intact enamel not penetrated. (Spec. 736, Neg. 15267; R.A.-A346, Neg. 15254.) C: Surface uptake of $Zn^{65}Cl_2$ with penetration of enamel defects and lamellae. Dense uptake in carious dentin. (Spec. 741, Neg. 15272; R.A.-A108, Neg. 15251)

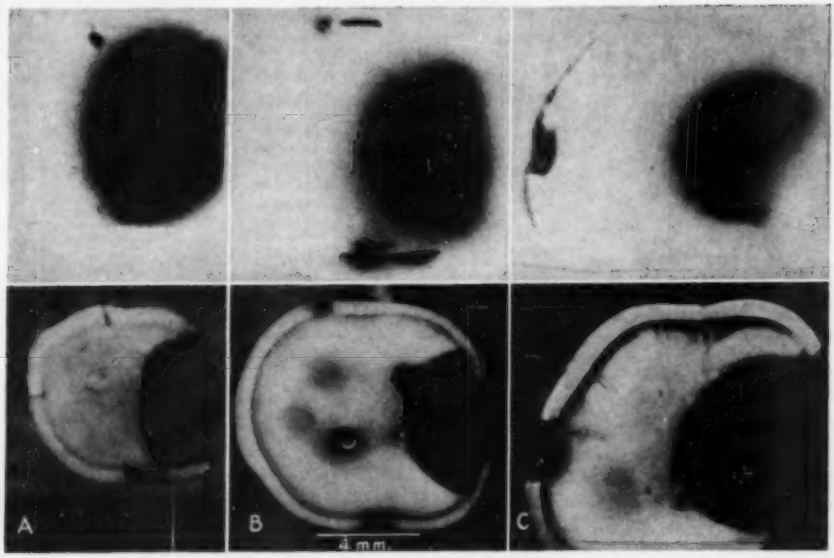

Fig. 5 • A: Surface uptake of $Zn^{65}Cl_2$ with penetration of silver nitrate stained lamella on buccal surface. The apparent expansion of the $Zn^{65}Cl_2$ penetration in the inner half of the enamel is owing to radiation from deeper layers of the enamel. (Spec. 744, Neg. 15270; R.A.-A99, Neg. 15195.) B: Dense penetration of $Zn^{65}Cl_2$ in two areas of penetrating enamel caries, and in the large open cavity. (Spec. 743, Neg. 15268; R.A.-A351, Neg. 15196.) C: Dense surface uptake of $Zn^{65}Cl_2$ with penetration of open cavities and carious dentin. (Spec. 749, Neg. 15370; R.A.-A373, Neg. 15343)

with the sensitivity of the radioautographic method. Table 4 describes three teeth which were treated with $Ag^{111}NO_3$. This isotope was separated from a target of palladium foil. Two solutions were prepared. The one used for the first two teeth (157, 158) was carrier-free $Ag^{111}NO_3$ in water. The activity of the solution was not determined. The activity of the specimens ranged from 450 to 3,000 counts per minute. The second solution, used to treat tooth 159, was diluted with ammoniacal silver nitrate. The activity of the specimens was 1,100 and 1,450 counts per minute.

Table 5 describes seven teeth which were treated with $Ag^{110}NO_3$. The solution was prepared by adding 0.1 ml. of an $Ag^{110}NO_3$ solution containing 0.647 millicurie per milliliter to 1 ml. of ammoniacal $AgNO_3$ solution. The activity of the specimens ranged from 600 to 6,000 counts per minute. Most of the specimens were between 1,000 and 2,000 counts per minute.

Of the 10 teeth 157, 158 and 159 were miscellaneous ones which had been in 10 per cent Formol for two months. The remaining teeth were kept moist and treated with the isotope within two hours after extraction. None of the teeth were pumiced; they were washed under tap water and dried with air blast before treatment. The radioactive $AgNO_3$ was applied for 10 minutes and then the teeth were immersed in 10 per cent Formol for 10 minutes. All teeth were dehydrated in alcohol and embedded in Selectron.

Fig. 6 • A: The upper radioautograph (exposure time one hour) shows dense uptake of $Zn^{65}Cl_2$ in carious enamel, carious fissures, and carious dentin. The middle view is a radioautograph exposed for seven and one-half hours and shows more detailed $Zn^{65}Cl_2$ penetration in the buccal enamel lamella (see arrow). In the specimen (below) the same area (see arrow) showed no apparent penetration by silver nitrate applied subsequent to the $Zn^{65}Cl_2$-$K_4Fe(CN)_6$ treatment. In the system of cracks and fissures connected with the lingual surface, there are areas which the lower radioautograph indicates are penetrated by $Zn^{65}Cl_2$ but in which the specimen does not show as much silver nitrate penetration. (Spec. 742, Neg. 15264; R.A.-A371, Neg. 15592; R.A.-A353, Neg. 15249.) B: Overexposed radioautograph shows surface uptake of $Zn^{65}Cl_2$ on enamel, cementum and amalgam filling. Penetration occurs only in the carious cementum and around the margins of the leaking filling. (Spec. 737, Neg. 15266; R.A.-A436, Neg. 15250.) C: Mesiobuccal cusp of upper first molar shows lack of penetration of enamel by $Zn^{65}Cl_2$. The stripes of dentin not stained by silver nitrate show slight penetration by $Zn^{65}Cl_2$. (Spec. 712, Neg. 15366; R.A.-944, Neg. 15349)

Table 4 • Penetration of dental structures by radioactive silver^{111} nitrate

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of section	Caries	Lamellae	Fissures
157	Lower right first bicuspid	†	Unknown	754	Transverse midcrown	+	−	−
				755	Transverse cervical	+	−	−
158	Upper right first bicuspid	†	Unknown	757‡	Transverse midcrown	+	−	−
				758	Transverse cervical	+	−	−
159	Lower right first bicuspid	†	Unknown	759	Transverse midcrown	+	+	−
				760	Transverse cervical	+	+	−

* All teeth showed surface uptake of Ag^{111} on enamel and cementum. Intact enamel was not penetrated but all carious areas and fissures were penetrated. All lamellae seen were penetrated.

† Miscellaneous teeth; two months in 10 per cent Formol.

‡ White opaque enamel penetrated. Stained dentin not penetrated.

The results of the radioautographic study are outlined in Tables 4 and 5. All teeth showed a surface uptake of radioactive $AgNO_3$ on enamel and cementum. Intact enamel was not penetrated but all carious lesions, fissures and observed lamellae were penetrated. Typical radioautographs are illustrated in Figures 7 to 10.

Lack of penetration of intact enamel is shown in Figure 7, A and B. There is surface uptake and penetration of a few minute carious lesions and carious dentin. The particle of cement in Figure 7, A is not penetrated. The specimen of Figure 7, A is not blackened and does not show visual penetration of the stable $AgNO_3$, yet the radioautographic density is fairly great. This emphasizes the great sensitivity of the radioautographic method. Silver nitrate penetrates beyond the point where the eye ceases to see blackening of the tooth. Thus, the level of sensitivity for visual blackening by stable silver nitrate is much less than that of radioautographic penetration by either radiosilver or radiozinc. For example, in the zinc specimens, instances were found where radiozinc penetrated but stable silver nitrate did not. This could be accounted for by lack of visual penetration of stable silver; yet it might still be present in the same subvisual amounts that is now found for radiosilver. Figure 7, C is similar; there is surface uptake on the amalgam filling and cementum and penetration of the occlusal fissure. Penetration is lacking in the white opaque area extending from the mesial contact to the dentoenamel junction and from which a metamorphosed dentin tract is seen extending to the pulp chamber.

Figure 8, A shows penetration of the surface lesions of the enamel as well as a strong uptake in the carious dentin. Some of the white opacities of the surface are not blackened although they were treated with ammoniacal silver nitrate of standard strength; this was observed in some of the radiozinc specimens also. Similar unpenetrated white opacities are seen in Figure 8, B. There is a prominent lamella associated with a surface lesion of caries. The uptake is so strong

in the carious fissures that the radioautographic density obscures the entire central portion. Figure 8, C also shows strong uptake in the large area of carious dentin, in the occlusal fissures and in the adherent periodontal tissues.

Figure 9 shows an instance in which exposed dentin is not penetrated. The eburnated dentin, although it is stained from previously active caries, is not generally penetrated, visually or by the isotope. The area of active caries is penetrated by both. Adherent periodontal tissue is strongly active.

The specimen in Figure 10, A shows an increased number of enamel defects near a large amalgam filling. The defects and carious dentin are penetrated both visually and by the isotope.

The radioautograph of Figure 10, B

Table 5 • Penetration of dental structures by radioactive silver[110] nitrate

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of section	Caries	Lamellae	Fissures
160	Upper right third molar	24†	Pulpitis	761	Longitudinal outer buccal quarter	+	−	−
				762	Inner buccal quarter	+	−	−
				763	Longitudinal inner lingual quarter	+	−	−
				764	Longitudinal outer lingual quarter	+	−	−
161	Upper right second molar	24†	Pulpitis	765	Transverse midcrown	+	+	−
				766	Transverse cervical	−	+	−
162	Lower left first molar	19	Pulpitis	768	Longitudinal buccal third	+	−	−
				770	Longitudinal lingual third	+	−	−
163	Upper right third molar	25‡	Pulpitis	771	Transverse midcrown	+	−	+
				772	Transverse cervical	+	−	−
164	Upper right second bicuspid	25‡	Pulpitis	774	Longitudinal mesial half	+	−	+
165	Lower left second molar	27	Periodontal abscess	778	Longitudinal middle third	−	−	+
166	Upper left second bicuspid	50	Pulpitis	780	Transverse buccal cusp	+	−	−
				781	Transverse lingual cusp	+	+	−

* All teeth showed surface uptake of Ag^{110} on enamel and cementum. Intact enamel was not penetrated but all carious areas and fissures were penetrated. All lamellae seen were penetrated.

† Patient C. Z.

‡ Patient E. B.

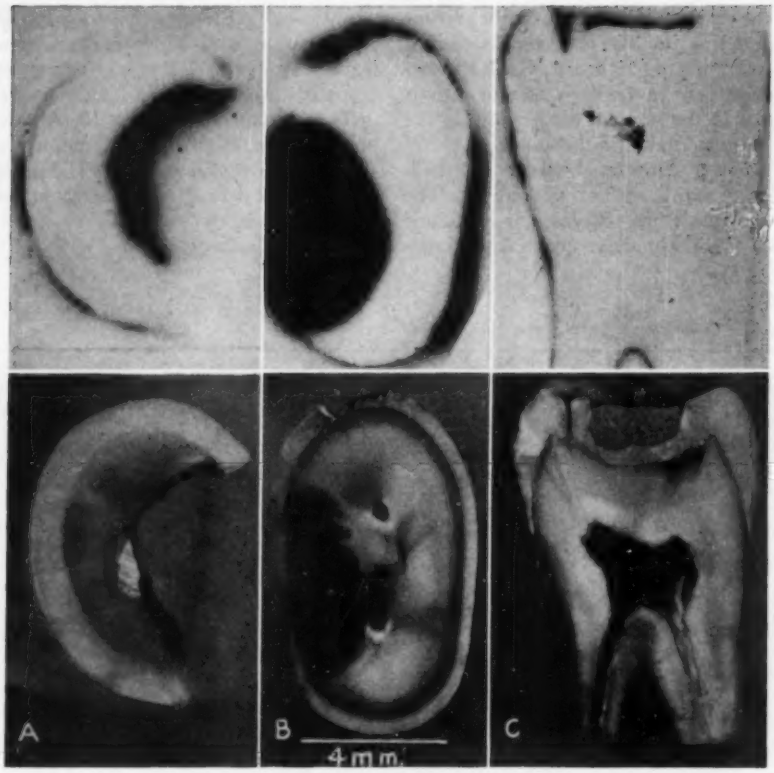

Fig. 7 • A: Dense surface uptake of $Ag^{111}NO_3$. Intact enamel not penetrated. Carious dentin penetrated. (Spec. 754, Neg. 15613; R.A.-979, Neg. 15358.) B: Dense surface uptake by $Ag^{111}NO_3$ with penetration of carious enamel and dentin. (Spec. 758, Neg. 15394; R.A.-932, Neg. 15488.) C: Dense surface uptake of $Ag^{110}NO_3$ on enamel and cementum, in occlusal fissure and on surface of amalgam filling. (Spec. 778, Neg. 15452; R.A.-A345, Neg. 15451)

shows strong surface uptake, penetration of carious dentin and of the opaque area of enamel caries. The stained enamel and dentin under the opaque area are not penetrated. The specimen is not blackened in spite of the dense exposure of the radioautograph. As in the case of Figure 7, A and B the $Ag^{111}NO_3$ was carrier-free.

The amalgam fillings of Figure 10, C do not show leaks at the margins either by the stable $AgNO_3$ or by the isotope. The amalgam filling of Figure 10, D on the other hand shows a slight penetration at the gingival margin by stable $AgNO_3$ and a dense penetration by the Ag^{110}.

PLUTONIUM^{239} (+6)
CITRATE COMPLEX

A suggestive observation at variance with all of the findings in previous sec-

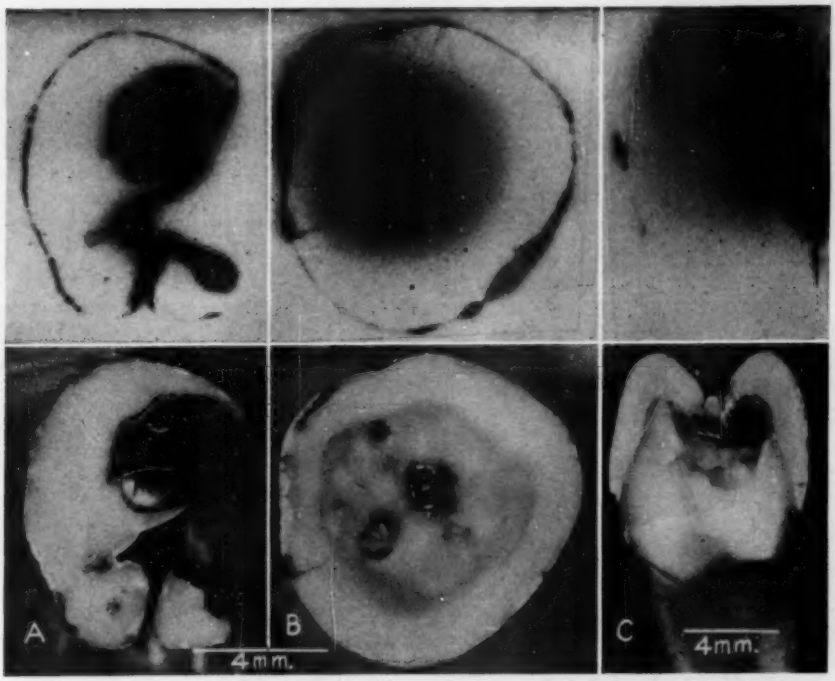

Fig. 8 • A: Dense surface uptake of $Ag^{110}NO_3$ with penetration of incipient enamel caries, fissure and carious dentin. (Spec. 771, Neg. 15373; R.A.-A434, Neg. 15340.) B: Dense surface uptake of $Ag^{110}NO_3$ on enamel with penetration of surface caries, fissures and lamella. (Spec. 765, Neg. 15415; R.A.-A656, Neg. 15355.) C: Surface uptake of $Ag^{110}NO_3$ on enamel and cementum, with penetration of cervical enamel caries, enamel fissures and carious dentin. Dense uptake by adherent periodontal tissue. (Spec. 774, Neg. 15515; R.A.-A433, Neg. 15514)

tions of this report is found in the Pu^{239} radioautograph of Figure 11. The enamel surface was penetrated only a short distance but in a narrow parallel band. Obvious defects readily stained by subsequent immersion in stable $AgNO_3$ were not penetrated by Pu^{239}. The Pu^{239} solution was acid, pH 4.5, and evidently etched the enamel surface as there is a complete staining of the otherwise intact enamel surface by $AgNO_3$. In Figure 11 the staining is visible especially along the upper, buccal surface. Pu^{239} (+6) citrate is known to complex onto organic material and it is possible that penetration was limited by this process.

The Pu^{239} solution had an activity of 15.3 microcuries per milliliter. Four hours after extraction the moist tooth was pumiced, washed, dried and benzene washed. It was immersed in the Pu^{239} solution for 33 minutes, placed in a vacuum chamber, and the pressure reduced to 20 inches of mercury. The excess Pu^{239} solution was washed from the surface with 15 ml. distilled water, delivered in 30 seconds. The tooth was then immersed in a 1 per cent ammonium oxalate solution, returned to the vacuum for 20 minutes, treated with silver nitrate

and 10 per cent Formol, surface dried and embedded in Selectron. The sections were ground under water. The specimens are described in Table 6.

PALLADIUM^{103} CHLORIDE

Two uncleansed teeth were treated with a solution of $Pd^{103}Cl_2$ an hour and a half after extraction. The Pd^{103} solution was prepared from a palladium foil target in a concentration of 40 per cent $Pd^{103}Cl_2$. The activity of the solution was not determined. The activity of the specimens ranged from 100 to 400 counts per minute. The $Pd^{103}Cl_2$ solution was applied to the teeth for 14 minutes. Subsequent treatment included drying and applica-

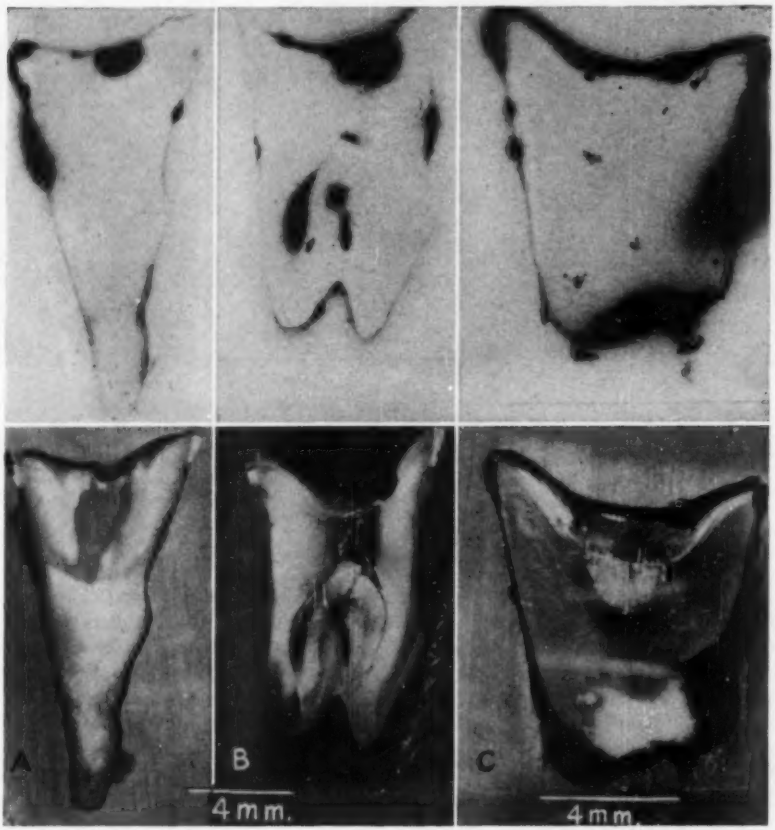

Fig. 9 • A, B and C: Dense surface uptake of $Ag^{110}NO_3$ on eburnated dentin, enamel and cementum of upper right third molar. Penetration of the eburnated dentin occurs only in an active lesion and not in the stained exposed tubuli. Carious enamel and adherent periodontal tissue are penetrated. (A: Spec. 763, Neg. 15504; R.A.-A335, Neg. 15503. B: Spec. 761, Neg. 15446; R.A.-A334, Neg. 15443. C: Spec. 762, Neg. 15374; R.A.-A347, Neg. 15359)

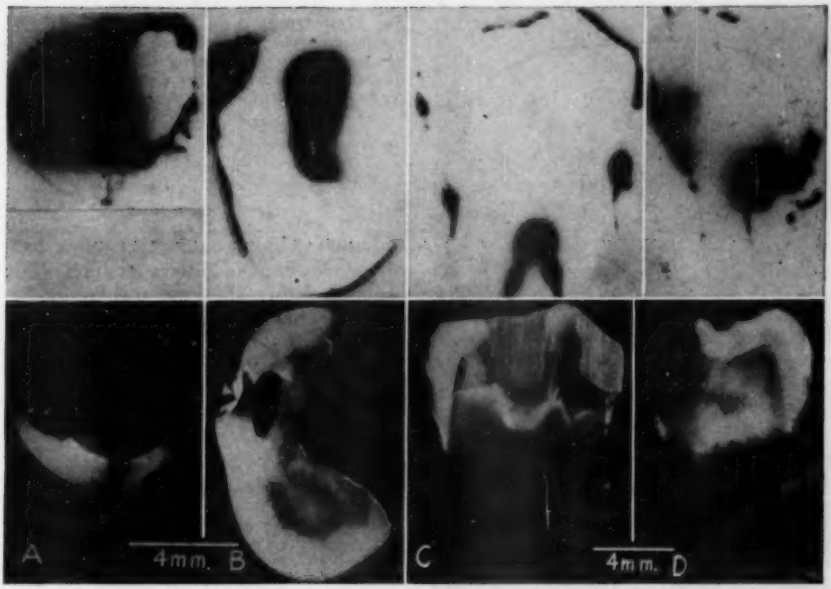

Fig. 10 • A: Surface uptake of $Ag^{110}NO_3$ on enamel and amalgam filling; dense penetration of carious dentin and lingual enamel cracks. (Spec. 781, Neg. 15417; R.A.-A543, Neg. 15356.) B: Dense surface uptake of $Ag^{111}NO_3$ on enamel. No penetration of intact enamel. White opaque enamel penetrated; underlying stained enamel and carious dentin not penetrated. Exposed mesial dentin penetrated. (Spec. 757, Neg. 15416; R.A.-931, Neg. 15516.) C: Dense surface uptake of $Ag^{110}NO_3$ on enamel, amalgam filling and cementum. No penetration of margins of fillings. Surface caries of enamel and adherent periodontal tissue penetrated. (Spec. 768, Neg. 15508; R.A.-A349, Neg. 15507.) D: Surface uptake of $Ag^{110}NO_3$ on enamel, amalgam filling and cementum. Dense penetration of leaking gingival margin of filling and of adherent periodontal tissue. (Spec. 770, Neg. 15506; R.A.-A329, Neg. 15505)

tion of potassium ferrocyanide solution for 10 minutes. Tooth 168 was treated with silver nitrate. Both teeth were surface dried and embedded in Selectron.

The specimens are described in Table 7. Figures 12 and 13 show strong surface uptake, penetration of all defects and lack of penetration of intact enamel. Figure 13 shows penetration of several lamellae.

COPPER^{64} NITRATE

Four teeth were pumiced, dried, washed with benzene, dried and treated with $Cu^{64}(NO_3)_2$ for five minutes. Two of the teeth (121, 122) were treated within 10 minutes after extraction; the other two (123, 124) were miscellaneous teeth which had been fixed in 10 per cent Formol for two months.

The $Cu^{64}(NO_3)_2$ solution was prepared from a cyclotron irradiated copper target. The activity of the solution was not measured; the activity of the sections ranged around 15,000 to 20,000 counts per minute.

The treated teeth were dried on absorbent paper and potassium ferrocyanide solution was applied for five minutes,

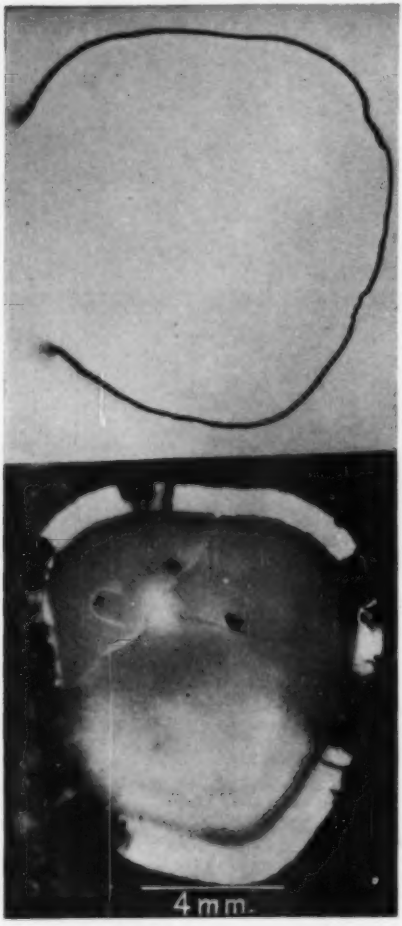

Fig. 11 • Strong surface uptake of $Pu^{239}(+6)$ citrate complex, pH 4.5, with remarkable lack of penetration of enamel structures subsequently stained with silver nitrate. (Spec. 922, Neg. 15389; R.A.-A659, Neg. 15455)

washed in running tap water for 30 minutes and sectioned under water.

The specimens are described in Table 8; typical radioautographs are shown in Figure 14. Figure 14, A shows dense surface uptake of Cu^{64} on the enamel and cementum. The dentin was exposed by bur cuts prior to treatment. The Cu^{64} appears to have penetrated the dentin but part of the spreading may be owing to halation from the intense penetrating radiation. Figure 14, B also shows lack of penetration of intact enamel. The occlusal fissure shows a strong uptake, as do enamel defects. The pulp chamber was penetrated through an artificial opening. Figure 14, C shows dense surface uptake and penetration of carious dentin.

DISCUSSION

The fact that every tooth treated with these eight isotopes did not show penetration of intact enamel indicates that these compounds have different properties from those reported separately.[9,10,11] Three classes of substances are evident from these studies according to their behavior with enamel. The first (nicotinamide, urea) has the property of diffuse penetration of intact enamel. The second (calcium, zinc, silver) does not penetrate intact enamel but does penetrate every damaged portion of a tooth. The third group (plutonium^{239}) attaches itself only to the surface and does not penetrate defects.

Arrested caries proved to be a difficult lesion to penetrate. This has often been observed with dyes and acids. All other enamel defects and carious lesions of dentin were penetrated by all of the iso-

9. Wainwright, W. W., and Lemoine, F. A. Rapid diffuse penetration of intact enamel and dentin by carbon^{14}-labeled urea. J.A.D.A. 41:135 (Aug.) 1950.

10. Wainwright, W. W. Time studies of the penetration of extracted human teeth by radioactive nicotinamide, urea, thiourea, and acetamide. I. Diffuse penetration from the enamel surface. In press.

11. Wainwright, W. W., and Belgorod, H. H. Time studies of the penetration of extracted human teeth by radioactive nicotinamide, urea, thiourea and acetamide. II. Penetration of dentin from the pulp chamber. In press.

Table 6 • Penetration of dental structures by radioactive plutonium^{239} (+ 6) citrate complex

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of transverse section	Caries	Lamellae	Fissures
227	Lower left third molar	30	Pulpitis	921 922 923	Occlusal Midcrown Cervical	— — —	— — —	— — —

* Tooth showed strong surface uptake. Intact enamel and surface enamel defects were not penetrated.

topes, with the exception of Pu^{239}. The penetration of the isotopes corresponded with the gross extent of the damaged areas.

In every case there was a surface uptake of the radioactive material which was not removed by washing in water. Lamellae were penetrated by all of the isotopes, except Pu^{239}. The frequency of enamel tracts penetrated by the isotopes and by stable $AgNO_3$ was greater in older teeth and especially in those which had fillings or crowns. Sognnaes[12] proposes that all lamellae arise from traumatic cracks and are later filled with organic material. Certainly the vulnerability of the tooth is increased by the presence of so many permeable tracts.

The tests of plugging by precipitation of radiozinc ferrocyanide show that the lamellae are penetrated to the same extent as they are by silver nitrate. The lamellae were subsequently penetrated by $AgNO_3$ and cannot be said to be plugged in the sense of being impermeable. In a few instances there was apparent plugging with lack of complete penetration subsequently by $AgNO_3$. This cannot be interpreted yet as complete plugging because the radioautographic method detects much smaller

12. Sognnaes, R. F. Organic elements of the enamel. IV. The gross morphology and the histological relationship of the lamellae to the organic framework of the enamel. J. D. Res. 29:260 (June) 1950.

Table 7 • Penetration of dental structures by radioactive palladium^{103} chloride

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of section	Caries	Lamellae	Fissures
189	Lower left second molar	46	Periodontosis	785	Longitudinal middle third	+	—	—
168	Lower left third molar	26	Malposed periodontal abscess	787A	Transverse near occlusal	—	—	+
				787B	Transverse near occlusal	—	+	—
				788	Transverse midcrown	—	+	—
				789	Transverse cervical	+	+	—

*All teeth showed surface uptake of $Pd^{103}Cl_2$ on enamel and cementum. Intact enamel was not penetrated but all carious areas and fissures were penetrated. All lamellae seen were penetrated.

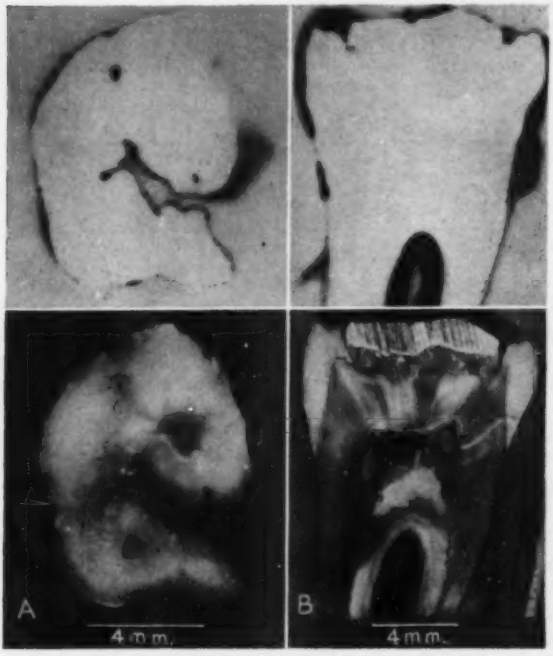

Fig. 12 • A: Surface uptake of $Pd^{109}Cl_2$ on enamel. (Spec. 787A, Neg. 15412; R.A.-A323, Neg. 15491.) B: Dense surface uptake of $Pd^{109}Cl_2$ on enamel, amalgam filling and cementum. Dense penetration at margins of leaking amalgam filling and in adherent periodontal tissue. No penetration of intact enamel. (Spec. 785, Neg. 15493; R.A.-A321, Neg. 15492)

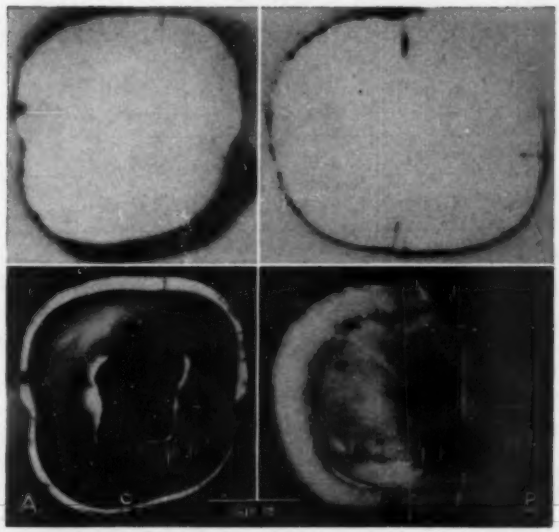

Fig. 13 • A and B: Dense surface uptake of $Pd^{109}Cl_2$ on enamel, and dense penetration of enamel defects, lamellae and adherent soft tissue. (A: Spec. 789, Neg. 15408; R.A.-A326, Neg. 15488. B: Spec. 788, Neg. 15409; R.A.-A325, Neg. 15487)

Table 8 • Penetration of dental structures by radioactive copper[64] nitrate

Tooth		Age of patient (years)	Reason for loss	Specimen		Penetration*		
Number	Location			Number	Plane of longitudinal section	Caries	Lamellae	Fissures
121	Lower right second mola	40	Pulpitis	665	Buccal half	+	+	−
122	Lower right third molar	24	Pulpitis	668	Lingual half	+	−	−
123	Lower left third molar	†	Unknown	670	Lingual half	−	−	+
124	Upper left third molar	†	Unknown	671 672	Buccal half Lingual half	+ +	− −	+ +

* All teeth showed strong surface uptake of $Cu^{64}(NO_3)_2$ on enamel and cementum. Intact enamel was not penetrated but all carious areas and fissures were penetrated. All lamellae seen were penetrated.

† Miscellaneous teeth; two months in 10 per cent Formol.

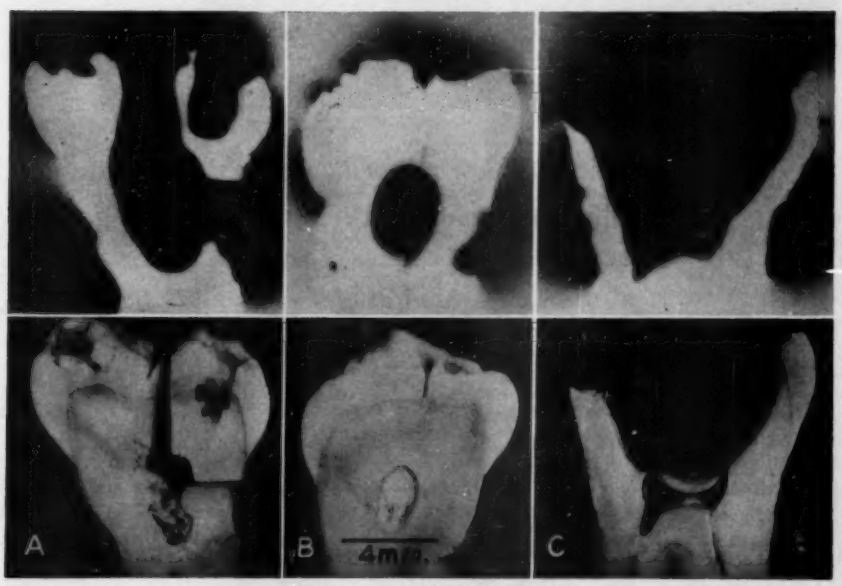

Fig. 14 • A and B: Dense surface uptake of $Cu^{64}(NO_3)_2$ on enamel, cementum and dentin of upper left third molar. Dentin exposed with bur prior to treatment. Note wide areas of density in the prepared openings indicating spread of radiation and penetration of dentin. Intact enamel not penetrated. (A: Spec. 671, Neg. 15463; R.A.-768, Neg. 15462. B: Spec. 672, Neg. 15458; R.A.-769, Neg. 15457.) C: Dense surface uptake of $Cu^{64}(NO_3)_2$ on enamel, dentin and cementum. Carious dentin penetrated. Intact enamel not penetrated. (Spec. 668, Neg. 15460; R.A.-765, Neg. 15459)

amounts of the isotope than the eye can see in blackening from silver nitrate. Thus, subvisual amounts of silver nitrate might be present and not be detected. Since zinc ferrocyanide does not plug completely this data would suggest that clinical impregnation treatments will need to be repeated at intervals in order to maintain whatever caries inhibiting effect they may have. The fact that lamellae were regularly penetrated in teeth not cleansed according to Gottlieb's[1] instructions suggests that various methods of preparation of the tooth surface be tried clinically. The teeth in this study were all dried by air blast before applying the radiozinc.

SUMMARY

1. Calcium[45] chloride, silver[110,111] nitrate, palladium[103] chloride, and copper[64] nitrate were found by radioautographic examination to penetrate enamel defects, lamellae and carious areas. Intact enamel was not penetrated although there was an uptake on the surface of enamel and cementum which was not removed by washing.

2. Zinc[63,65] chloride was precipitated by potassium ferrocyanide on tooth surfaces and was found to penetrate lamellae, carious lesions, fissures and other defects. Since nearly all of the lamellae could be subsequently penetrated by stable $AgNO_3$ they were not considered to be completely plugged.

3. Plutonium[239] citrate complex attached itself to the surface of enamel and cementum but did not penetrate defects and carious areas subsequently stained by silver nitrate.

Penetration of radiocalcium at the margins of filling materials: a preliminary report

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Minneapolis

Buccal, Class V, cavities were prepared in eight wet, sound, extracted, lower second bicuspids. Each cavity was filled; one with amalgam, one with a gold inlay, one with a gold foil, one with an oxyphosphate of zinc cement, one with silicate and three with acrylic resin. In the three teeth filled with acrylic resin, one was filled with resin after it had been mixed on a slab, one after the resin had polymerized for 30 seconds in a sealed jar without spatulation and one after the resin had polymerized for 30 seconds in a sealed jar with spatulation.

After the fillings were inserted, the roots were coated with wax and the clinical crowns were immersed in a solution of radiocalcium (Ca^{45})[1] for 48 hours.

From the University of Minnesota, departments of dentistry and physiological chemistry, Minneapolis.

1. Specific activity 80 MC per gram calcium. This radiocalcium was obtained from the Oak Ridge National Laboratory on allocation from the U.S. Atomic Energy Commission.

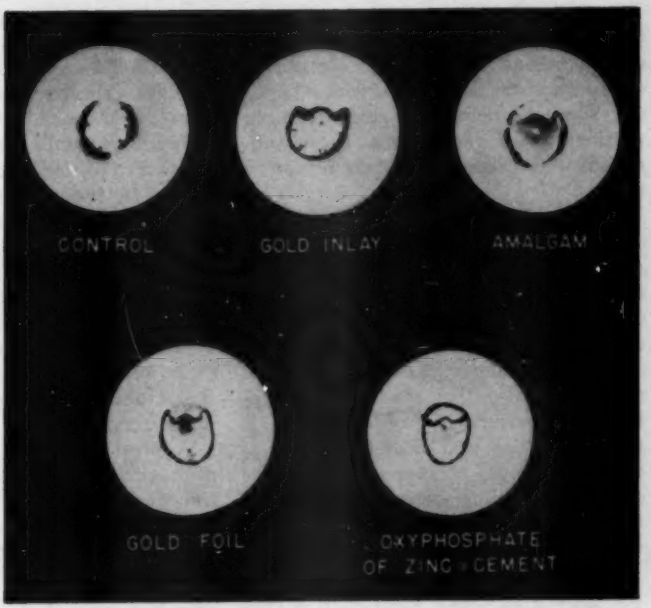

Fig. 1 • The control, gold inlay, amalgam, gold foil and cement specimens

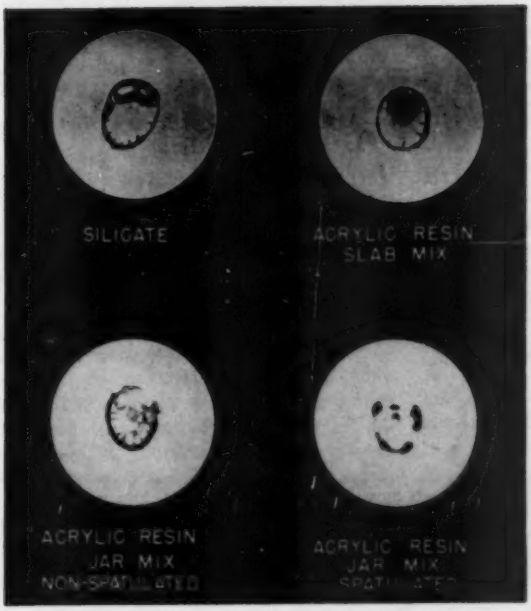

Fig. 2 • The silicate and acrylic resin specimens

The teeth were then washed with distilled water and were embedded in methyl methacrylate resin. Horizontal cross sections were prepared with a bandsaw through the widest gingivoocclusal portion of the restorations. Radioautographs were prepared on Agfa no screen film.

A control was run to determine the chance of technical contamination error. A wet, sound, extracted tooth was immersed in radiocalcium and then the cavity was prepared and filled with acrylic resin.

The radioautographs of the control sample revealed that the technical possibility of errors of contamination is minimal. They also demonstrated that the radiocalcium penetrated the margins of all of the filling materials used but in varying amounts. The amount of penetration is shown in Figures 1 and 2.

Figure 1 shows the radioautographs of the control specimen filled with acrylic resin, the inlay specimen, the amalgam specimen, the gold foil specimen and the oxyphosphate of zinc specimen. These reveal no evidence of the absorption of radioactive calcium into the filling material with the exception of gold foil and there appears to be less penetration of the radiocalcium at the margins of the amalgam restoration.

Figure 2 shows the radioautographs of the silicate specimen and the three acrylic resin specimens. All three of the differently mixed acrylic resins had been compressively retained in their respective cavities by means of a continuous band matrix until polymerization rendered the material hard. The cavities had been overfilled so that there was a flashing at the margins. The flashing was removed 30 minutes after the material had set up.

Figure 2 shows that the silicate restoration became dehydrated, with resultant shrinkage and cracking. In the slab mixing of acrylic resin no attempt was made to control proportions of monomer or polymer and the material was inserted in the consistency of wet sand. In the spatulated acrylic resins and in those not spatulated, a manufacturer's dispenser was used which delivered monomer and polymer in a ratio of approximately 1 to 3 by volume. These mixes were placed in a sealed jar for 30 seconds and were of a "tacky" consistency when inserted into the cavity. With the spatulated jar mix, definite shrinkage took place in the middle third of the restoration adjacent to the buccoaxial wall.

Use of Recorded Knowledge • Failure to make full use of recorded chemical knowledge may seriously impede a research program and make it most costly. For whenever helpful information and data recorded in the literature are overlooked, it is virtually certain that needless experimental work will be done in the laboratory. It is a rule with few exceptions that the cost of laboratory experimentation is many times greater than that involved in having a literature expert locate the record of previous experimentation. *J. W. Perry, Chem. Eng. News 28:4530, 1950.*

Problems related to occlusion with complete upper and partial lower dentures

L. E. Kurth, D.D.S., Chicago

The main objectives in the construction of complete upper dentures and partial lower dentures should be the restoration of masticatory efficiency and "the perpetual preservation of the remaining structures," (M. M. DeVan). The other objectives, retention, stability, comfort, esthetics and patient satisfaction, should of course be recognized and striven for by the operator. The problem of occlusion is related to the satisfactory completion of the above objectives. This problem is simplified if the partial lower denture is primarily tooth-borne, for then the problems would be comparable to those involved in constructing a complete upper denture to occlude with a full complement of natural mandibular teeth. This discussion, however, will consider only those problems arising when a patient is completely edentulous in the upper jaw and has six lower anterior teeth.

An intelligent understanding of occlusion presupposes a knowledge of mandibular movements for it is during masticatory function that the prosthetic appliances will be placed under the greatest stress. The physiologic act of mastication can be divided into incision, the actual mastication and finally, the swallowing of the bolus of food. The lips, cheek, tongue, palatal area, all associated musculature and mucosa, as well as the teeth and their supporting structures are directly related to this masticatory cycle and are dependent on one another for its successful completion. This paper will be primarily concerned with the direction of the forces exerted on the teeth and their support during the actual mastication of food. This mandibular movement can be roughly classified in two divisions; the functional and nonfunctional movements. There is some overlapping of these divisions which will be explained later. The nonfunctional movements also can be placed in two categories: (1) the mandibular glide, or movement determined solely by the temporomandibular articulation and its muscles and ligaments and the occlusal or incisal surfaces of the remaining teeth and (2) the "free movements"[1] of the mandible where there is no tooth contact. Unfortunately, in the past, functional mandibular movements have been described as being synonymous with the nonfunctioning glide. Theories of occlusion were based on this nonfunctional movement and articulators were devised to follow these movements. "It is not for one moment disputed that workers who use individual measurements of condyle

Presented before the Section on Full Denture Prosthesis and the Section on Partial Denture Prosthesis, ninety-second annual session of the American Dental Association, Washington, D.C., October 18, 1951.

1. Sicher, Harry. Oral anatomy. St. Louis, C. V. Mosby Co., 1949, p. 163.

path inclination and adaptable articulators produce prosthetic occlusion of great accuracy. What is here denied is that such records contribute anything essential to the excellence of the result."[2]

THE MANDIBULAR GLIDE

The mandibular glide has definite characteristics and its direction of movement can be accurately checked.[3] The free movements of the mandible are so varied and have such a wide range of possibilities that tracings can be made in any or all directions, being limited only by the anatomy of the individual. To prevent confusion in the interpretation of this or any movement on tracings or photographs, cognizance should be taken of its plane of projection. Any point may be selected to trace the movement of the mandible, the most usual one being the incisor point which is the contact point between the two lower central incisors. To obtain a complete picture of its direction, the movement of this point in space must be referred to the three planes which are called horizontal or top (Fig. 1, left); frontal or front (Fig. 1, right); and sagittal or side (Fig. 1, below). Emphasis on the plane being discussed is of paramount importance be-

2. Craddock, F. W. The accuracy and practical value of records of condyle path inclination. J.A.D.A. 38:697 (June) 1949.

3. Kurth, L. E. Mandibular movements in mastication. J.A.D.A. 29:1769 (Oct.) 1942.

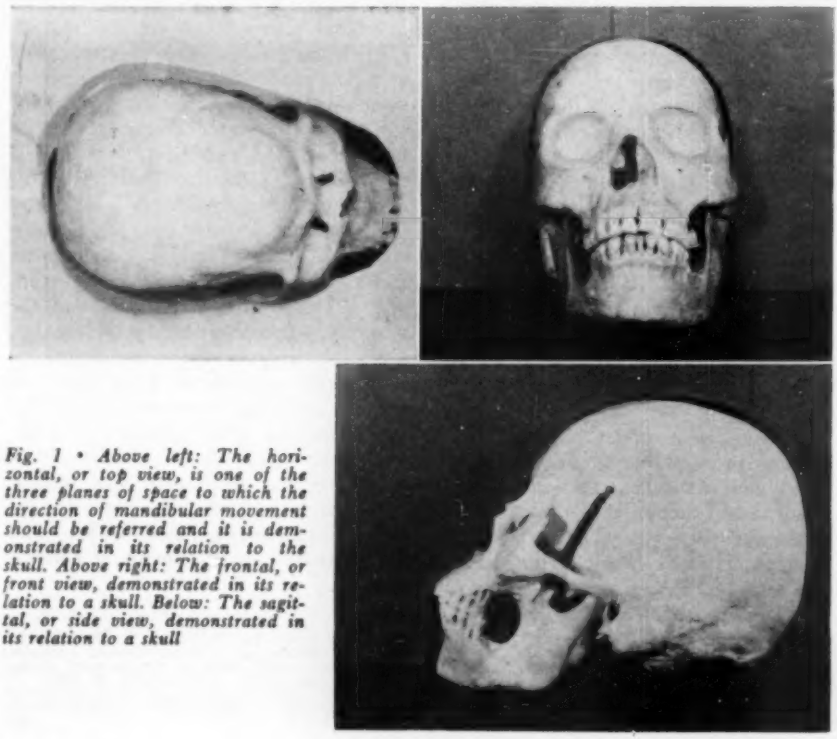

Fig. 1 • Above left: The horizontal, or top view, is one of the three planes of space to which the direction of mandibular movement should be referred and it is demonstrated in its relation to the skull. Above right: The frontal, or front view, demonstrated in its relation to a skull. Below: The sagittal, or side view, demonstrated in its relation to a skull

cause there can be a wide variance of direction of this movement encountered on each of the three planes. An example of this difference would be the tracing of the nonfunctioning gliding movement of the incisor point of a patient with 32 teeth in normal occlusion. The tracing of the incisor point on the horizontal plane would be a graphic delineation of the well-known Gothic arch or arrow point tracing. If this movement were traced on the frontal plane, an inverted V would be formed (which has been confused with the Gothic arch), while on the sagittal plane a line is obtained which runs downward and forward. If the patient was edentulous and an intraoral central bearing screw was used as the only point of contact between the upper and lower jaw, the tracing of the incisor point during a nonfunctional gliding movement of the mandible would appear comparable in the horizontal plane to the one described here for the patient with natural dentition. The tracing on the frontal plane, however, would be either V shaped or almost a 180 degree angle, while the tracing on the sagittal plane would be a line running upward and forward. It can be seen that although the tracings on the horizontal plane are identical for both the edentulous individuals and those with natural teeth, the tracings in the other two planes are the exact opposite (Fig. 2).

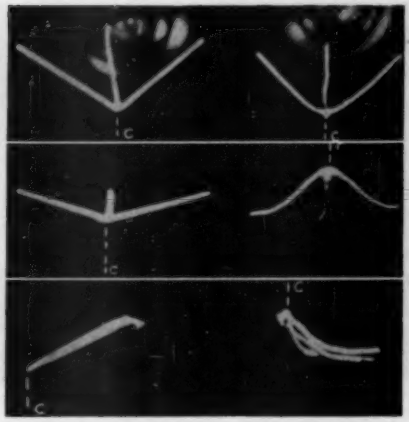

Fig. 2 • Wire models depicting direction of the nonfunctional mandibular glide for edentulous (left) and dentulous (right) individuals. (Centric is designated by the letter C.) Top: Horizontal or top view; center: frontal or front view; bottom: sagittal or side view

FUNCTIONAL MOVEMENTS

Functional or chewing movements bear no relation to the mandibular glide except at the static position of centric relation. A functional movement possibly may be comparable to one of the free movements. All investigators of the functional chewing stroke, using many different technics to trace this movement, have obtained similar tracings.[5-7] To interpret these tracings or photographs intelligently, the plane to which they are referred should be indicated. Most of the investigators have referred this movement to the frontal or sagittal plane. (The author, insofar as is known to him, is the only investigator who has referred these movements to these planes and also included the horizontal plane, the one used clinically in dentistry.) The concept of the glide and the functional chewing stroke being identical is untenable in the light of these investigations. The functional stroke, as traced by stroboscopic photographs of an indicator attached to the incisor point of the lower central incisors in the horizontal plane, depicts an ellipsoidal tracing posterior to centric relation (Fig. 3, above left). In the frontal plane, it is elliptic or tear shaped, with its apex at centric relation

4. Boswell, J. V. Practical occlusion in relation to complete dentures. J. Pros. Den. 1:307 (May) 1951.

5. Payne, S. Howard. A study of posterior occlusion in duplicate dentures. J. Pros. Den. 1:322 (May) 1951.

6. Hildebrand, G. Y. Studies in the masticatory movements of the human lower jaw. (Supp. Vol. 61, Skandinav. Arch f. Physiol.) Berlin, Walter DeGruyter & Co., 1931.

7. Jankelson, B. Unpublished data.

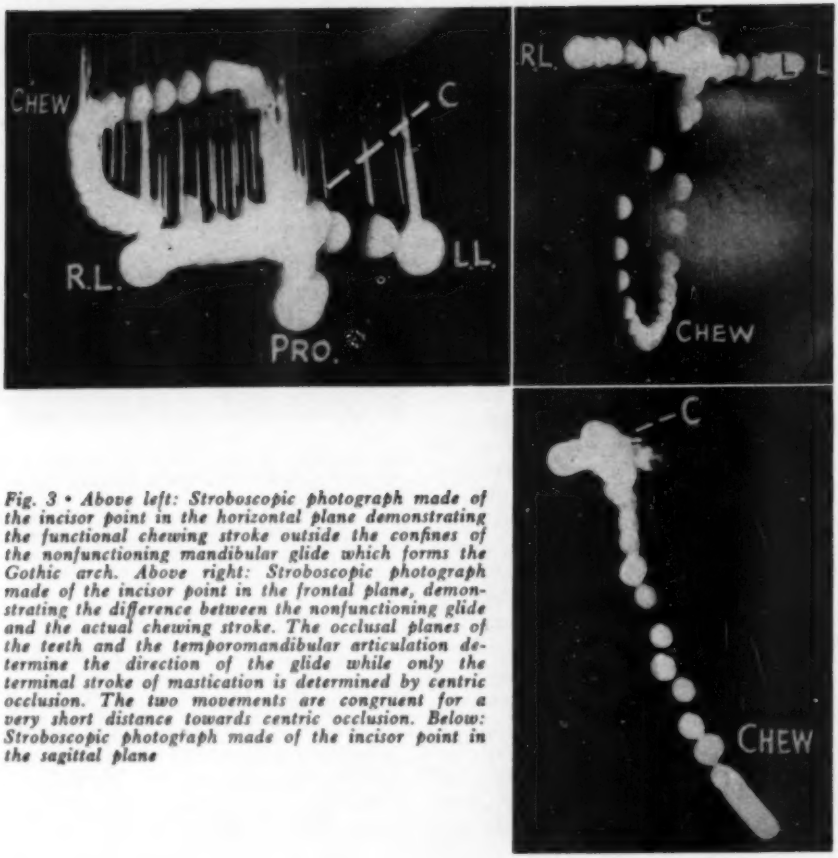

Fig. 3 • Above left: Stroboscopic photograph made of the incisor point in the horizontal plane demonstrating the functional chewing stroke outside the confines of the nonfunctioning mandibular glide which forms the Gothic arch. Above right: Stroboscopic photograph made of the incisor point in the frontal plane, demonstrating the difference between the nonfunctioning glide and the actual chewing stroke. The occlusal planes of the teeth and the temporomandibular articulation determine the direction of the glide while only the terminal stroke of mastication is determined by centric occlusion. The two movements are congruent for a very short distance towards centric occlusion. Below: Stroboscopic photograph made of the incisor point in the sagittal plane

(Fig. 3, above right), while in the sagittal plane it runs elliptically upward and forward to centric relation (Fig. 3, below). In the frontal plane this movement has been measured by Hildebrand,[6] and the actual glide of the lower tooth against the upper tooth into centric position, measured in the region of the incisors, averaged between 1 and 2 mm. This same movement measured in the sagittal plane, amounted to a "few tenths of a millimeter." Jankelson[7] found that the upper and lower teeth did not contact during function until after the second or third swallow of the bolus of masticated food.

PRACTICAL APPLICATION

The practical application of these functional movements and the occlusal forces to the full upper and partial lower dentures will now be discussed. A study cast of the lower jaw is obtained and mounted on a suitable surveying instrument, as the first step preparatory to the construction of a lingual bar. The surveyor has been "used to determine the most favor-

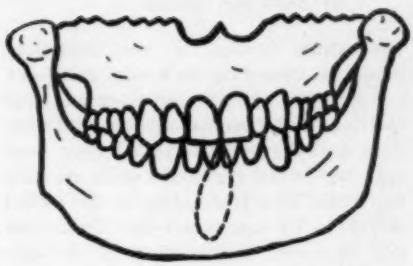

Fig. 4 • Frontal view demonstrating diagrammatically the stroboscopic photograph shown in Figure 3, above right. The dotted line, or functional stroke, can be said to be almost vertical when viewed in this plane

able path of insertion for the partial denture."[8] No one denies that this is a necessary consideration but it should not be the only one. The lower partial denture is dependent on properly constructed and positioned clasps or precision attachments, stress-breakers, bars, and indirect retainers for retention and stability. Since the main forces to be exerted on the appliance will be during masticatory function, another postulate must be added for the use of the surveyor; namely, that the surveyed model should take the direction of these chewing forces into consideration. If the operator follows this tenet, the appliance so constructed will react against these upsetting forces. If these forces are not recognized and not overcome by the appliance, deleterious effects may result to the occlusion with subsequent resorption of the residual alveolar ridges.

MASTICATORY FORCES

These masticatory forces, as demonstrated earlier, have different directions depending on the plane in which they are viewed. Arbitrary statements such as "Vertical masticatory stress, upward in upper cases, downward in lowers, may force the denture into the compressible mucosa, causing loss of the underlying alveolar process through resorption,"[9] are not tenable except when viewed in the frontal plane. Figure 4 demonstrates diagrammatically that the force of mastication can be stated to be almost vertical when viewed in the frontal plane, but Figure 5, a sagittal or side view of the masticatory stroke, demonstrates conclusively that the direction of this masticatory force is not vertical but is an arc upward and forward. It is unnecessary to repeat the many statements in the literature by other authors who say that the occlusal force is vertical. Most of them make this observation without referring to the plane under discussion, or they consider the force as being vertical in either the sagittal or frontal plane.

8. Boucher, Carl O. Dental prosthetic laboratory manual. St. Louis, C. V. Mosby Co., 1947, p. 230.

9. Schmidt, Arthur H. Partial dentures: planning and designing. J.A.D.A. 35:562 (Oct. 15) 1947.

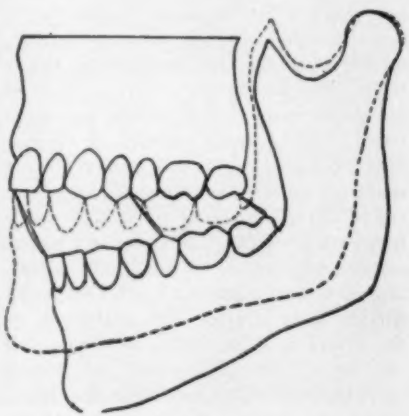

Fig. 5 • Sagittal view demonstrating diagrammatically the stroboscopic photograph shown in Figure 3, below. The mandible, to return to centric occlusion (depicted by the dotted lines), will follow approximately the direction of the lines running upward and forward from the incisor point, the second bicuspid and distobuccal cusp of the lower second molar

These theories, which are based on the false assumption that the direction of occlusal force in any one plane is always identical with the direction of force in another or in all planes, is fallacious and unscientific (Fig. 2). Figure 5 graphically shows that the functional ellipsoidal movement which the incisor point makes is greater in both angulation and extent than a similar tracing of the tip of the lower second bicuspid or the distobuccal cusp of the lower second molar because of the rotatory component of this movement.

In the hypothetical case under discussion, the angle which this functional movement makes to the horizontal occlusal plane changes from approximately 62 degrees at the incisor to 51 degrees at the bicuspid and 33 degrees at the distobuccal cusps of the lower second molar. The direction of force exerted on the occlusal surfaces in the sagittal plane during function is upward and forward against the upper denture and downward and backward on the free end saddles of the lower partial denture, this force being of greater magnitude and angulation toward the molar teeth. This masticatory force is exerted on the denture bases before the teeth come into occlusal contact, for equilibrium occurs when the motion of the mandible stops either because of occlusal contact or when the bolus of food resists further movement. The maxillary tuberosities and the palatal vault are admirably situated anatomically to counteract this upward and forward movement of the upper denture, while the lingual bar and its attachments are the main factors to be considered to neutralize the downward and backward movement of the free end saddles of the partial lower denture. Is it any wonder that when this direction of force is not taken into consideration in the surveying for the lingual bar, the saddle areas of the lower partial denture may be forced downward into the mucosa?

SURVEYING THE MODEL

The study model of the mandible should be placed on the model clamps of the surveyor and the surveyor adjusted to bring the retromolar areas on both the right and the left side to a higher level than the incisal edges of the six remaining teeth. This positioning of the model will help to counteract the downward and backward displacement of the saddles of the partial denture during mastication (Fig. 6). The usual procedure of surveying is then followed to determine the location of clasps, rests, bar and indirect retainers. Three-quarter crowns may have to be constructed or other operative procedures undertaken on the abutment teeth to obtain suitable retention for the clasps or precision attachments. All operative work indicated by this preliminary survey should be completed on the remaining teeth before taking the final impressions of the mandible and maxilla.

The master mandibular cast is surveyed in the same manner as the study cast and is prepared for duplication. The lingual bar is cast and adjusted to the master model. The casting is tried in the patient's mouth. Because of the angle in which the cast was surveyed, it should be inserted from above and behind the abutment, downward and forward into position. Well adapted bite-blocks should be attached to the bar and an accurate base should be constructed on the maxillary cast as the first step in obtaining centric relation.

The mandible has to be correctly positioned to the maxilla in three dimensions to achieve centric relation as a starting point for the development of occlusion. There are many technics to obtain this desired result. A central bearing screw may be used and an extraoral tracing device to obtain a Gothic arch or arrow point tracing. The intraoral plate containing the central bearing screw is luted to the maxillary bite-block by means of

compound. Its opposing plate is also securely attached to the casting and the free end saddles of the mandibular bite-block. The central bearing screw is then set to a vertical opening which has been previously determined. The extraoral tracer and its waxed tracing plate are attached to the upper and lower bite-blocks. The patient is instructed to make nonfunctional gliding movements of the mandible which eventually will describe a Gothic arch. The tracing obtained in this manner is a nonfunctional movement, but the centric relation is the only point common to both the functional and nonfunctional movements of the mandible.

While the patient holds the mandible immobile, with the tracer held in the apex of the Gothic arch, plaster is injected between the intraoral plates to act as a check-bite. After the bite-blocks, with the interposed check-bite, are removed from the mouth, they are securely attached to their casts which are mounted on an articulating instrument. The lateral or protrusive gliding strokes of the mandible are unimportant from a functional viewpoint, or to set the condylar adjustment of an articulator, for it is possible to alter the direction and extent of the lateral glide tracings by changing the plane on which the central bearing screw moves from flat to convex or concave. The question then arises as to what tracing on what plane is the correct one for the patient. Therefore, it can be said subjectively that the lateral nonfunctioning glides are not essential for the development of an occlusion.

Anterior teeth are selected for the maxillary denture which will be esthetically harmonious with the remaining mandibular teeth. They should be set up

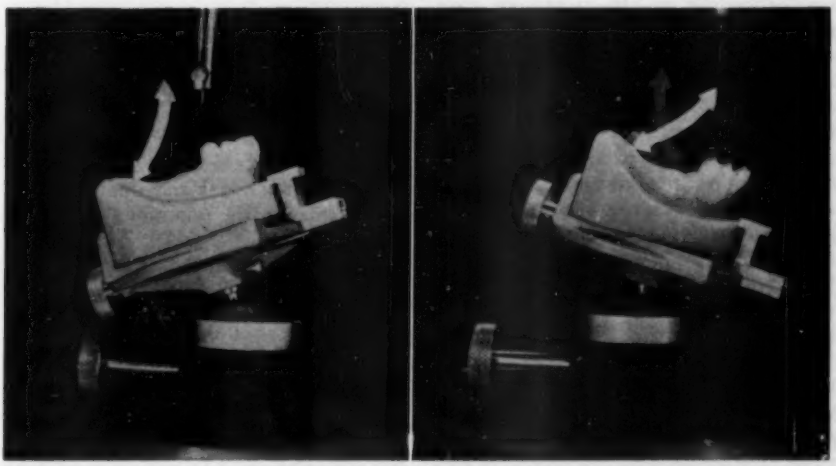

Fig. 6 • Left: Study model of the lower jaw mounted on a surveying instrument. The arrow depicts the direction of masticatory force in the sagittal plane (see Fig. 3, below and Fig. 5). If the model is surveyed in this position, the casting will not counteract this force. Partial dentures made to this angle of insertion will more readily be forced into the mucosa. Right: The proper positioning of the cast of a free end saddle partial denture preparatory for surveying. The retromolar pad is higher than the incisal plane. The white arrow depicts the direction of masticatory forces in this plane; the dark arrow is the line of insertion of the partial denture to counteract these forces

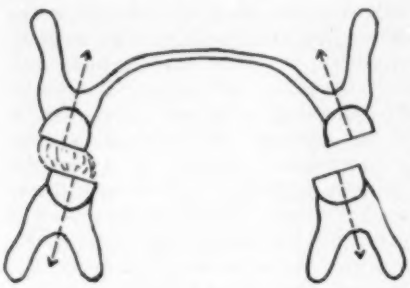

Fig. 7 • Frontal plane of the resultants of masticatory forces (dotted arrows) which are exerted on the denture bases during the chewing of a bolus of food. Stability of the upper denture will be increased by this positioning of the occlusal surfaces of the posterior teeth

so there is no contact with the lower teeth when they are in centric occlusion. An overjet of more than 2 mm. is desirable in all instances, this distance being dependent on the anatomic and esthetic considerations for each individual case. Whether to use anatomic or nonanatomic posterior teeth is a matter of individual preference for both will function if correctly set up. Nonanatomic posterior teeth[10] set to an occlusal plane determined by the lower anterior teeth can be used. These teeth are set to this plane without any curve of Spee from the sagittal view. From a front view, however, the buccal margin of the lower teeth should be at a higher horizontal level than their linguoocclusal margin (Fig. 7). From a top or horizontal view the lower posterior teeth should be placed so that the forces of occlusion would be centered lingually to the crest of the ridge. The upper posterior teeth are correspondingly set to these lower teeth. The resultants of forces of mastication applied to the occlusal surfaces of the teeth in centric relation, before equilibrium is reached, invariably are at right angles to these occlusal surfaces. By setting the teeth in this manner, these resultants will aid the stability of the upper denture during mastication.

The maintenance of this occlusal contact and the preservation of the remaining structures is an important part of prosthetic service. If vertical dimension is lost, a forward movement of the mandible will occur with a possible destruction of the maxillary anterior ridge especially when the lower anterior teeth come in contact with the upper denture. Therefore, continuing observation of these patients is essential and relines or rebases of the dentures should be done whenever necessary to preserve the original occlusion.

SUMMARY AND CONCLUSION

1. The objectives for the construction of a complete upper denture and a partial lower denture were stated and the restoration of masticatory efficiency through correct occlusion and the preservation of all the remaining structures were considered to be the most important objectives.

2. The mandibular movements were classified and emphasis placed on the importance of designating the planes of space under discussion.

3. The functional and nonfunctional movements of the mandible were described.

4. The masticatory force simulates a vertical direction in the frontal plane. In the sagittal plane the direction of this force runs upward and forward. The resultant force which would be applied to the lower partial denture would be downward and backward.

5. The surveyor should be used in the construction of lingual bars for free end saddle partial dentures primarily to counteract the direction of masticatory forces downward and backward. This is accomplished by positioning the model

10. Kurth, L. E. Anatomic and non-anatomic teeth. J.A.D.A. 31:35 (Jan.) 1944.

preparatory to surveying so that the retromolar areas will be at a higher horizontal level than the remaining anterior teeth. (This positioning would be reversed for a maxillary model with free end saddles.)

6. The resultants of masticatory force on the occlusal surfaces, as viewed in the frontal plane, should be utilized to increase the stability of the upper denture.

7. Continued observation of the occlusion is essential and relines or rebases of the prosthetic appliances may be necessary to preserve the original plan of occlusion.

25 East Washington Street

Problems related to the construction of complete upper and partial lower dentures

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The problems involved in constructing replacements consisting of a combination of full upper and partial lower dentures are of interest to all general practitioners because need for this type of replacement is so frequently encountered. It has been observed that the loss of teeth follows a fairly definite pattern. During young adult life some posterior teeth may be lost in either the upper or the lower jaw or in both. In some instances these missing teeth have been replaced with either fixed or removable appliances. The history of too many of these cases shows a breakdown of supporting abutments with subsequent loss of these teeth and extension of the appliance, until, in later adult life, all the upper teeth, together with most of the lower posterior teeth, are lost. The lower anterior teeth and the bicuspids seem to be more resistant to the influences which caused the loss of the other teeth, so that the combination of a full upper and a partial lower replacement is common.

Before attempting any dental operation a proper evaluation and diagnosis[1] must be made. This can be accomplished best with the aid of full mouth roentgenograms, and study models mounted on an articulating instrument, together with a clinical examination of the mouth. This will give a complete picture of oral conditions; one that can be obtained in no other way.

In the edentulous maxillary arch, roentgenograms will reveal the presence of root fragments or unerupted teeth, the presence of areas of residual infection, sharp, spinous spiculae of bone; all of which require surgical intervention to provide a base suitable for the reception of a full denture. Study models will aid in determining the necessity of reducing undercut areas and prominent tuberosities. Study models also will disclose low muscle attachment, a frenum that may interfere with retention which would re-

Presented before the Section on Full Denture Prosthesis and the Section on Partial Denture Prosthesis, ninety-second annual session of the American Dental Association, Washington, D.C., October 18, 1951.

1. Kingery, R. H. Examination and diagnosis preliminary to full denture construction. J.A.D.A. 23:1707 (Sept.) 1936.

quire incision or excision and the depth of the vault.

In the partially edentulous mandibular arch, roentgenograms are essential in determining the health of the remaining teeth and their ability to support and retain a partial denture. The length and size of the roots of the abutment teeth, together with the amount of enveloping alveolar bone, must be considered. Properly prepared and mounted study models will reveal clearly the relation of the mandibular arch to the maxillary arch and indicate what modifications of the remaining teeth are required to restore a correct occlusal plane.

BASIC REQUIREMENTS

Six essential requirements for the construction of a satisfactory denture are:

1. A reproduction in some artificial media, usually artificial stone, of all the supporting and retentive tissues of the jaws.
2. Normal vertical dimension.
3. Correct centric relation.
4. Correct position of artificial teeth.
5. An occlusal plane in harmony with the patient's own condylar excursions.
6. Esthetics.

To accomplish the first requirement, all anatomical structures involved must be clearly understood, so that an impression of these structures will produce a model representing the actual conditions existing in the mouth with definite limits of coverage. Today this recording of the denture base in its undistorted position is an accepted basic requirement.[2,3] By the close adaptation of the base to the tissue, retention and stability are obtained. One factor frequently overlooked is the relation of the peripheral borders to the reflection of the mucosa. The peripheral borders must be so defined that all spaces remaining when muscles are contracted are completely filled by the denture border. The border should intimately contact the tissues outside as well as inside. It is by this intimate peripheral contact that additional retention is obtained.

The method of reproducing the area to be covered by a full denture has been the subject of study and research through the years.[4] The literature indicates that plaster of Paris was the material of choice in the early days. The early teachers used plaster of Paris in well shaped metal trays, corrected, when necessary, with wax or modeling compounds.

Next came a group who followed the work of J. W. Greene who advocated the use of modeling compound in metal trays. Because of the inability of many dentists to master the technic of handling compound properly, a method of using this compound impression as a tray to carry a final plaster wash was introduced.

In later years the method of processing a special tray of vulcanite, plastic or shellac base material was adopted.[5]

Today, the accepted method is a prepared oversize tray of plastic, either of the self-processing variety or a plastic sheet, heated and pressed on to the model. This tray is further modified by wax or modeling compound so as to produce a well-defined peripheral border. The impression material is either zinc oxide cement or alginate.

MAXILLARY IMPRESSION

The condition of the tissues is determined by digital examination. After this examination, the operator can decide the type of material to be used for the primary impression. If the mucosa is firm,

2. Denen, H. E. Negative pressure impressions for full dentures. J.A.D.A. 31:898 (July) 1944.
3. Boucher, C. O. Impressions for complete dentures. J.A.D.A. 30:14 (Jan.) 1943.
4. Pryor, W. J. Evaluation of several full denture impression technics. J.A.D.A. 37:159 (Aug.) 1948.
5. Smith, E. S. A comparison of some of the methods of taking impressions for full dentures. J.A.D.A. 18:1123 (June) 1931.

modeling compound is the material of choice. If the tissues are flabby and easily displaced, an alginate should be used.

The posterior extremity of the denture base is located on the palate and is marked by indelible pencil. This is transferred to the primary impression so that the finished tray is exactly the right length. This is accomplished by having the patient say "ah." An indelible mark is placed at the junction of the hard and soft palate, slightly distal to the fovea palatinus. The hamular notches on either side are located and these points connected by a line on the vibrating part of the palate. This line will be plainly transferred to the white alginate. In cases where red compound is used, a piece of white tape is placed on the rear of the impression. The impression is replaced in the mouth and the line transferred to the tape. The impression is then trimmed to this line before the model is poured.

PREPARATION OF THE TRAY

The primary model is outlined for preparation of the tray in the following manner. A line is drawn completely around the periphery, approximately 4 mm. short of possible muscle attachment as indicated on the primary model. This is to indicate the limits of the spacer. One thickness of baseplate wax is adapted to the model and trimmed to this line. If soft or pendulous tissue is present, an additional thickness of wax is used. Over this is adapted one of the self-processing acrylics, extending 2 mm. beyond the peripheral borders of the spacer, but still short of muscle attachments (Fig. 1). A suitable handle is provided.

This tray is then carefully fitted in the mouth and the posterior border is checked to see that it ends in the proper position. The peripheral borders are checked for muscular interference as the tray must not contact contracted muscles. Low fusing green stick compound is attached with dry heat to the entire peripheral

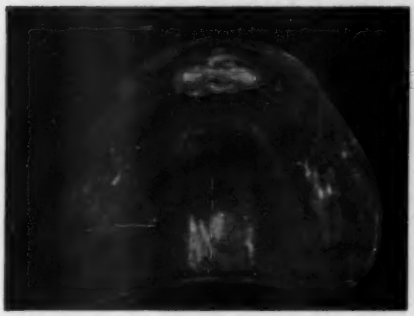

Fig. 1 • Oversize clear plastic tray

border of the tray and across the postdam area.

The tray, with softened compound, is placed in the mouth and the patient is requested to open wide, thereby stretching the muscles. The compound is chilled and the tray removed. The peripheral borders are then further adapted, section by section, until a well-defined border is obtained (Fig. 2, above left). Excess compound extending beyond the posterior border is cut away.

COMPLETING THE IMPRESSION

Holes are now bored in the palate and labial segments of the tray, with a no. 8 bur. Excess compound is removed from the inner surface of the tray and the labial surface of the compound border is lightly scraped (Fig. 2, above right). A mouth-temperature impression wax is painted over the palate area of the tray with no. 3 camel's hair brush.

The tray with wax is reinserted in the mouth and an impression of the palate area is obtained. The purpose of this wax impression is twofold; to provide a stop for the tray and to create slight displacement for those tissues which will tolerate such displacement.

The final impression is obtained by lining the tray completely, including borders, with a zinc oxide paste or alginate (Fig.

2, below). The tray with impression material is then inserted in the mouth with sufficient pressure to send it to place. Pressure is then released.

When the paste is beginning to set, the patient is requested to contract the muscles of expression. When the impression paste is thoroughly set, the impression is removed. Before inserting the tray with zinc oxide impression material, ropy saliva should be cut by using a mouthwash of aromatic ammonia. If alginate is used, the mouth should be thoroughly dried. This type of impression should satisfy the first requirement; that is, exact reproduction of all the supporting and retentive tissues of the upper jaw.

PARTIAL LOWER DENTURE

In dealing with the problem of combining a full upper denture with a partial lower denture, it is necessary to decide what modifications of the remaining teeth of the partially edentulous lower jaw are required. Since some teeth are present in the lower jaw, an occlusion is already established. The occlusal plane is seldom one that can be used satisfactorily, without some change. It is essential, therefore, to have roentgenograms and study models to afford proper evaluation and diagnosis. The type of partial denture to be constructed must be considered. It may be one with clasps. If so, what type of clasp? And what teeth are more suitable for clasping? Their ability to withstand additional forces must be determined and their relation to the stability of the partial denture. Where shall the rest be placed? Is indirect retention needed and where should it be placed? Do teeth to be clasped require protection, such as gold inlay, three-quarter gold crown or full

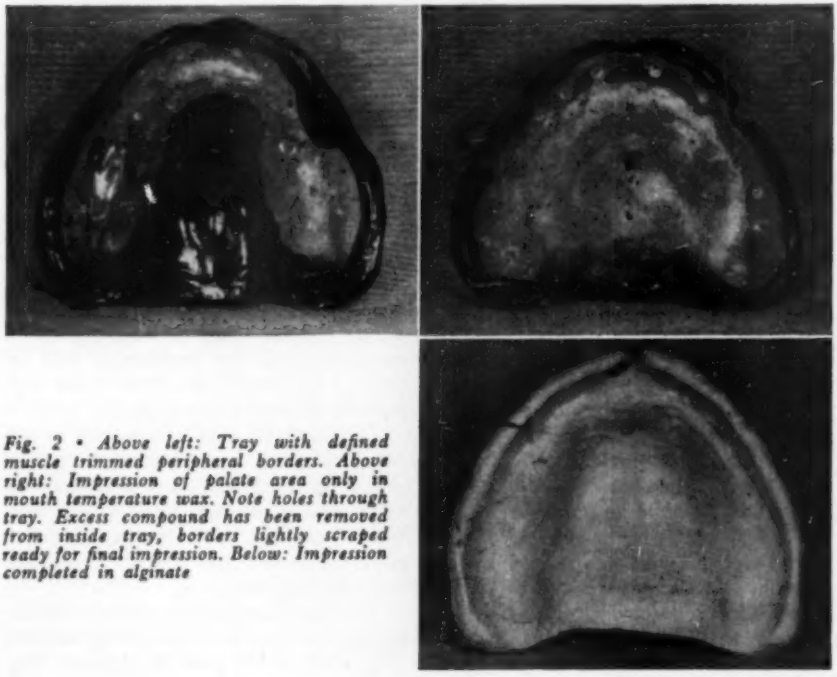

Fig. 2 • Above left: Tray with defined muscle trimmed peripheral borders. Above right: Impression of palate area only in mouth temperature wax. Note holes through tray. Excess compound has been removed from inside tray, borders lightly scraped ready for final impression. Below: Impression completed in alginate

cast crown? If clasps are to be used on anterior teeth, shall an inlay be placed to receive a lug or shall the lingual arm of the clasp be carried over the incisal edge?

If internal attachments are indicated, what type of castings are needed? Should three-quarter gold crowns, full cast crowns or plastic veneer gold crowns be used? Or perhaps a combination of clasps and internal attachments may be indicated. Roentgenographic study of the pulp should be made to determine the extent to which the tooth may be cut.

CLASSIFICATION OF PARTIAL DENTURES

Before attempting to reproduce the structures involved in the lower partial prosthesis, the fact must be considered that two kinds of tissue are involved: one, the hard, unyielding teeth, and the other, the resilient mucosa of the edentulous spaces. Here the operator is faced with the problem of distributing and equalizing the forces of mastication over these two distinct kinds of tissue. Partial dentures have been divided into three general classifications: tooth-borne; tissue-borne and tooth and tissue borne.

The first two types of partial dentures do not create too great a problem with regard to equalization of stresses. In tooth-borne prostheses, the problem is primarily one of support and retention with proper distribution of forces over the remaining teeth.

Tissue-borne partial dentures, which are those involving the retention of not more than three of the patient's own teeth, are handled similarly to a full denture. That is, support is obtained by proper adaptation and extension with definite peripheral borders. The teeth remaining are used only for stabilization.

With appliances borne by both tooth and tissue, another question arises over the best means of equalizing ridge and tooth support.

Articles published on partial denture construction indicate that there are three distinct schools of thought.[6]

1. Those who believe that stress between resilient tissues and teeth can best be equalized by the use of some form of stress-breaker.
2. Those who believe that equalization of stress can best be accomplished either by the impression—that is, the impression of the ridge area taken under a moderate degree of pressure, while the teeth are recorded in a free flowing elastic material—or by physiologic rebasing after the denture has been processed.
3. Those who advocate the distribution of stress over all or most of the remaining teeth as the best measure of reducing stress over any one part.

Each method has proponents who have written many scholarly articles in support of their particular contention.

All of these methods have certain advantages. Their use would depend primarily on the type of partial denture to be constructed. With precision attachments, which hold the saddle firmly to the abutment teeth in partial dentures borne by tooth and tissue, some form of stress-breaker should be utilized. Where a clasp is used or a modified type of semi-precision attachment is used, stress-breakers serve no useful purpose.

The danger of physiologic rebasing, or pressure-impression, is overstimulation of the tissues under function which will result, in time, in loss of bony support. It is recognized that slight denture motion during function produces a stimulating and favorable response of the tissue supporting a denture, while excessive motion or force applied to this tissue will result in resorption of bony support with creation of further untoward sequelae.

6. Steffel, V. L. Fundamental principles involved in partial denture design. J.A.D.A. 42:534 (May) 1951.

MODIFICATION OF LOWER OCCLUSAL PLANE

When a patient has arrived at a point where all upper teeth and most of the lower teeth have been lost, the remaining lower teeth frequently have drifted, tilted or extruded. This provides a plane quite unsuited to the stabilization of an upper denture or the proper replacement of teeth in missing spaces, without considerable modification. Frequently a second or third molar is present on one or both sides. These teeth are often tilted at an angle that makes them unsuitable for clasping. Some anterior teeth may be extruded while others show wear.

Roentgenograms and study models make it possible to determine whether the tilted molars have sufficient bony support to permit their utilization as the posterior anchors of the partial denture. If so, they should be retained and the proper relation of them to the other teeth and the occlusal plane obtained by the use of cast gold crowns. Extruded anterior teeth should be ground to normal length. Teeth out of the plane of occlusion, either buccally or lingually, should be realigned by proper restorations or extracted. If a clasp partial denture is contemplated, the teeth to be clasped are selected and positions of occlusal rests marked, so that vertical forces applied will be in the direction of the long axes of the teeth, including the anterior teeth. An occlusal rest should never be placed on the inclined surface of an anterior tooth. Vertical forces applied to this tooth, with a rest so placed, will result in the labial movement of the tooth, in loss of vertical support, resorption of bone around the tooth and eventual loss of the tooth. Rests on anterior teeth should be carried over the incisal edge, either mesially or distally into a properly prepared incisal rest. Here it is better to utilize the mesial-incisal angle for the rest because this permits the construction of a clasp with less bulk.

Although it is recognized that such rests may have the disadvantage of showing a small amount of metal, other beneficial results will more than offset this disadvantage.

EXPLANATION TO PATIENT

All the information obtained from a study of the models, together with a diagnosis and prognosis should be communicated to the patient before any work is attempted in the mouth.[7] Too often dentists are prone to take for granted that because they, as dentists, understand the need for certain operations, such as grinding of teeth for rests and to improve the occlusion, therefore, the patient does also. With adequate explanation and demonstration on study models the dentist often will have a more cooperative patient, one who will willingly agree to operations which he, in his own mind, formerly may have considered unnecessary or harmful.

All procedures, as outlined on the study models, are carried out. Tilted molars or bicuspids are realigned by cast gold or plastic veneer crowns. Lug seats are cut into wax patterns before casting and all the occlusal rest positions are prepared. The marginal ridge, where the lug will rest, is cut to provide a sufficient thickness of metal, and the rest is slanted toward the center of the tooth, so that the occlusal forces will tend to hold the clasp in close relationship to the tooth. Anterior teeth may have inlays or three-quarter crowns for the purpose of receiving lugs, or an incisal rest must be prepared. Wherever a tooth is ground the area must be polished. The occlusal table of all castings should be reduced in width so as to provide a better relation to the upper artificial teeth, and to reduce stress in these areas.

7. DeVan, M. M. Methods of procedure in a diagnostic service to the edentulous patient. J.A.D.A. 29: 1981 (Nov.) 1942.

PARTIAL LOWER IMPRESSION

With these preparations complete and with castings in place, the operator is ready to take an impression. This can be obtained readily with alginate or hydrocolloid. Sometimes it is desirable not to cement the cast crowns but to remove them with the impression. This permits the use of a deeper and more precise lug seat. It also permits the realignment of the walls of the castings thereby giving a better path of insertion.

When the castings are to be removed in the impression, a small amount of compound should be placed in the tray over the area of castings and anterior teeth, to act as a stop. An impression of the occlusal surfaces of these teeth and castings is taken in the compound. Excess compound is cut away so that only the imprint of the occlusal surface and the incisal edge of the teeth remain. The impression tray, with the alginate, is then carried to place until it rests on these compound imprinted areas. This compound impression permits the placement of the castings back in the impression, in a definite seat.

Partial dentures with clasps constitute the majority of partial restorations. They are easier to construct and obviously much less costly. They may be so constructed that they will not bind the denture rigidly to the abutment teeth and thus permit some degree of mobility in prostheses borne by tooth and tissue and reduce the strain on the abutment teeth.

The most serious objections to the clasp type of denture are the poor esthetic effect and the tendency to cause caries of the abutment teeth, because food is held in contact with the teeth when proper care and mouth hygiene are not observed.

"STABILIZING SQUARE SEAT" ATTACHMENTS

To overcome these disadvantages and to utilize the favorable factors of internal attachments, we have been using, for many years, what we call a "stabilizing square seat attachment."[8] This consists of a three-quarter crown, into which is cut a deep lug seat or slot extending the full length of the crown on the mesial or distal surface, as conditions require, and a lingual Roach-type clasp set into a horizontal groove on the opposite side of the three-quarter or full crown.

The lug seat or slot has squared parallel walls. It is not keyed in, thus permitting the male member to move in a horizontal as well as a vertical direction. This provides a positive seat for the male portion attached to the denture to rest in and transmit the force of mastication to the supporting teeth in the direction of the long axis of the tooth. The fact that the male portion of this type of attachment is permitted to move horizontally obviates strain on the supporting teeth in dentures borne by tooth and tissue.

The advantages of this type of construction are as follows:

1. Abutment teeth are protected against decay.
2. Labial clasp arms are eliminated for better esthetics.
3. Horizontal strains are minimized because the attachments, when properly seated, exert no pressure against the tooth.
4. It provides its own stress-breaking in dentures borne by tooth and tissue.
5. It is comparatively simple to construct and less costly than a precision attachment.

CONSTRUCTION OF ATTACHMENTS

The minimum coverage of the abutment teeth should be a three-quarter gold crown. A full or plastic veneer crown is preferable. Observation of a number of these cases, over a period of years, indi-

8. Standard, S. G. Functional removable partial dentures with stabilizing seat attachments. New York D. J. 14:92 (Feb.) 1948.

Fig. 3 • Tool for making sleeve against die preliminary to waxing of three-quarter crown

cated some errors, not in the principle, but in the application. Under certain conditions it was not always possible to have the end of the lingual arm in direct apposition to the slot, and so the teeth showed a tendency to move away from the lug.

In order to prevent this condition, an additional seat on the opposite side of the casting is prepared. The lingual arm forming the retentive element of this attachment is taken off from the linguo-occlusal angle of the casting, and is curved downward toward the gingiva and then upward toward the opposite side, ending in a depression previously prepared in the casting. This design works excellently in stabilizing the abutment teeth.

The teeth selected for abutments are prepared. If a three-quarter crown is to be used, boxes are cut in the mesial and distal walls of sufficient depth and width to accommodate sleeves to be placed in the casting (Fig. 3). If a full crown is planned, the walls are sufficiently tapered so that the sleeves will be within the circumference of the casting. Impressions of these preparations are taken. Dies are made and transfer copings prepared.

With transfer copings in place and properly seated, an impression can be taken (Fig. 4). Plaster of Paris is used to insure accuracy in seating the copings with the dies in place. Here again, the operator must be sure that the impression takes in all the teeth and ridge areas to be covered by the saddles of the partial denture. An accurate reproduction of the retromolar area, together with the lingual and buccal flange areas is necessary.

RETROMOLAR AREA

The retromolar pad, or pear shaped area, is of great significance in both full dentures and partial dentures with extension saddles.[9] This structure acts as the posterior support of a saddle, absorbing occlusal stress that would otherwise result in bony resorption. Careful study of the anatomy of this region will make the importance of its use to support the heels of a full or partial denture apparent.

This elevated triangular region of bone over the obliterated third molar socket is the result of deposition of bone mesially and the retention of the distal wall of the third molar socket. This bony region furnishes the attachment for muscles and other structures identified with the pharyngeal wall. The surface appearance is similar to soft tissue found elsewhere on the edentulous ridges. This mucous tissue is underlaid with dense fibrous elastic tissue, with numerous mucous glands in its deeper strata.

In order to be sure of obtaining the full limits of the lingual flange area with a free flowing material such as plaster of Paris, it is often necessary to adapt wax to the lingual flange of the tray in order to depress the floor of the mouth when taking the impression.

The same principle, as to border termination in full dentures, should be observed in partial dentures with extension saddles. That is, all borders must end in soft tissue. If the lingual flange of the extension saddle or partial dentures ends against a prominent mylohyoid ridge, the

9. Swanson, J. H. Retromolar area and its relation to adjacent structures. J.A.D.A. 29:44 (Jan.) 1942.

result always is painful to the patient and creates considerable difficulty for the operator in relieving it. The impression is sectioned and removed. The transfer copings, with dies, are placed in position and model is poured. This satisfies the first requirement for the lower partial denture; that is, the accurate recording of all teeth and tissues in a normal and undistorted position.

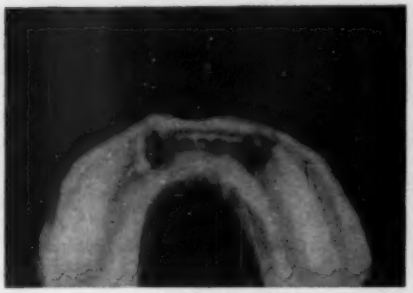

Fig. 4 • Plaster impression with copings and dies in place

TENTATIVE CENTRIC RELATION AND VERTICAL DIMENSION

Stabilized baseplates are prepared on the upper and lower models and a wax biterim attached. Stabilized baseplates now can be made of self-processing plastic, or by pressing a thin sheet of plastic on to the model. Shellac baseplates need no longer be used. However, if it is found necessary to use this latter material, it should be stabilized either with modeling compound or one of the zinc oxide impression pastes.

The upper wax bite is trimmed to indicate the length of the upper teeth, and an occlusal plane[10] established in the wax in the usual manner; that is, a plane parallel to an imaginary line drawn horizontally through the pupils of eyes, and anteroposteriorly, paralleling a line from the tragus of the ear to the ala of the nose.

The upper biterim also is trimmed to accommodate the normally relaxed position of the upper lip and to create proper fullness. This wax bite plane is used by the laboratory technician as a blueprint to indicate the length and width of the anterior teeth and their position relative to the arch.

IMPORTANCE OF CORRECT VERTICAL DIMENSION

These wax biterims are used to register a tentative centric relation and vertical dimension. Correct vertical dimension plays an important part, not only in the improved appearance of the patient, but also in the comfort derived from dentures in function. Establishment of vertical dimension is too often a guess. Niswonger[11] and Thompson[12] have shown that the physiologic rest position of an adult is constant and can be used as a landmark in arriving at a correct vertical dimension. By measuring the physiologic rest position, it is necessary only to reduce the measurement sufficiently to provide a freeway space of from 2 to 5 mm. depending on the exigencies of the case.

Boos[13] has demonstrated by the use of a gnathodynamometer that muscles of mastication function at maximum force of contraction when there is a critical point between the origin and insertion. This power point is closely related to the physiologic rest position. A vertical dimension established at a height greater than this physiologic rest position not only creates a problem of clacking teeth during conversation but will result in considerable pain over the ridges. If the patient is persistent enough to continue

10. Heisler, J. C. Theory of establishing the plane of occlusion for both dentulous and edentulous patients. J.A.D.A. 31:37 (March) 1944.

11. Niswonger, M. E. Rest position of the mandible and the centric relation. J.A.D.A. 21:1572 (Sept.) 1934.

12. Thompson, J. R. The rest position of the mandible and its significance to dental science. J.A.D.A. 33:151 (Feb.) 1946.

13. Boos, R. H. Intermaxillary relation established by biting power. J.A.D.A. 27:1192 (Aug.) 1940.

wearing the dentures, nature's attempt to restore normal muscle function will result in atrophy of the bases and loss of vertical dimension, until the normal freeway space is restored. Conversely, too great a closure[14] of the bite from the physiologic rest position results in loss of biting power. Sagging muscles not only cause facial deformity but also a degree of atrophy from lack of proper function.

The best results are obtained when a vertical height is close enough to the physiologic rest position to permit the patient to make the "m" or "s" sound without making tooth contact. This is usually a distance between the upper and lower first bicuspids of not more than 3 mm. The upper and lower biterims are trimmed to this pre-established height. These bases with rims attached are inserted in the mouth and the patient is instructed to close his jaws in centric relation. It is not important that this centric relation be exact at this time as it will be corrected later. The upper baseplate and biterim is also used to obtain a face-bow registration.

FACE-BOW REGISTRATION

The use of the face-bow seems to be a controversial issue. Some practitioners advocate the use of the face-bow in every instance where an adjustable articulator is used. However, doubts have been expressed by some prosthodontists as to the value of this instrument. It seems logical to assume that, unless the various inclined planes established on the occlusal surfaces of the teeth in the process of obtaining a balanced occlusion on an articulating instrument are obtained at the same relative plane on the articulator as in the mouth, the occluded teeth will not follow the same pathways.

With this face-bow registration, tentative centric relation and vertical dimension, the full upper model and partial lower model are mounted on an adjustable articulator.

CORRECTED CENTRIC RELATION

A correct centric relation is registered by the use of a Gothic arch tracing device,[15] either intraoral or extraoral, with a central bearing point. There are any number of these instruments on the market. The principle of the central bearing point is to equalize muscular force in closing. Centric position should be taken with a minimum of muscular action, with just sufficient contraction to keep the central bearing point in contact with the metal plate. Observation of the Gothic arch tracing is helpful in determining when the patient's jaws are in centric relation. Usually if the patient moves the lower jaw anteroposteriorly for fully two minutes, the muscles become fatigued and a correct centric relation can be obtained readily. To make the bases secure plaster of Paris may be injected between the rims as a means of locking them.

The lower model is removed from the articulator and reset in the correct centric position.

DESIGN OF PARTIAL DENTURE

The model of the lower partial denture, with castings in position, is duplicated in some refractory material and the frame designed (Fig. 5). If the partial denture is completely tooth-borne, metal saddles can be used to advantage. But when a partial denture with saddle extension is borne by tooth and tissue, the saddle should be in acrylic, not only to reduce the weight of the denture, but also to permit periodic rebasing.

A metal frame is sometimes designed for a partial denture with saddle extension and stabilizing seat attachments on the abutment teeth. In this case, a con-

14. Rogers, W. M., and Applebaum, E. Changes in the mandible following closure of the bite with particular reference to edentulous patients. J.A.D.A. 28: 1573 (Oct.) 1941.

15. Simpson, Homer. Registration of centric relation in complete denture prosthesis. J.A.D.A. 26:1682 (Oct.) 1939.

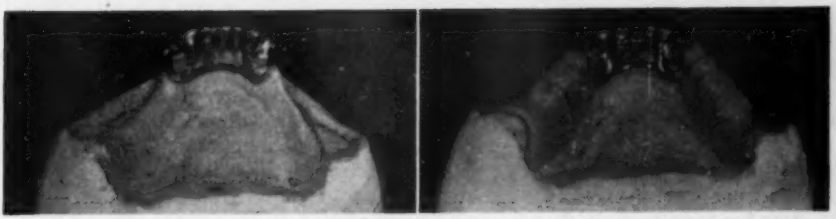

Fig. 5 • Left: Model of mandible with castings in place. Right: Completed partial denture seated on model

tinuous clasp, or rather a strap, is used. This continuous strap, or clasp, has also created considerable controversy. Some operators condemn it forcefully. But if it is properly designed for the purpose for which it is intended, it is a great advantage. The purpose of this strap is twofold:[16] (1) to distribute lateral forces and (2) to act as an indirect retainer.

With every lateral force there is a downward vertical force which if applied to the end of the saddle would tend to raise this strap away from contact with the anterior teeth, thus defeating the primary purpose. However, if this strap is designed so as to fit over the cingulum of the anterior teeth with labial flanges that contact the mesial and distal surfaces of the teeth, this strap will remain in contact with the anterior teeth under any normal biting force, thus distributing this force over all the teeth.

This strap is continued into the mesial slot to form the anterior mesial stabilizing lug. The entire assembly is connected to the lingual bar with struts located in appropriate positions. The distal stabilizing lug is connected to the bar as it is carried over the ridge, to form the extension for the attachment of acrylic base. The design of the lingual bar should conform to the convolutions of the tissue but not be in contact with it. The entire design must be rigid so as to form a nonflexible connector for the bases. The entire partial lower denture should function as a unit; therefore, flexibility is contraindicated.

POSITION OF ARTIFICIAL TEETH

The proper mold and shade of teeth are selected. Teeth are set up on lower metal framework and the upper plastic base, and are tried in the mouth for the purpose of checking centric relation and esthetics. The placement of the artificial teeth in the partial lower denture should follow the same principles which apply to a full lower denture; that is, the teeth must be centered over the ridge.

The upper posterior teeth will follow in the same plane and interdigitate with the lower posterior teeth, except in those instances where the mandible is much larger than the maxilla. In this situation, it is often necessary to place the posterior upper teeth in a cross-bite relationship. A great deal more latitude is permitted in the placing of the upper anterior teeth. Since the position of these teeth plays such an important part in esthetics, it is controlled by the esthetic requirements. To obtain correct esthetics it is necessary that the ridge lap of the anterior teeth be labial to the ridge, and not over the center.

CHECKING CENTRIC RELATION

When a Gothic tracing device is used on plastic bases with compound rims, and

16. Trapozzano, V. R. Partial dentures. In Handbook of dental practice, Grossman, L. I. Philadelphia, J. B. Lippincott Co., 1948, p. 363.

the central bearing point of the instrument is accurately located so as to equalize properly muscular force, the centric relation thus obtained is usually accurate.

However, there are times when the patient is unable to inscribe a Gothic arch tracing with a sharp apex. Or perhaps an error has been made in the placement of the instrument, and there is a doubt as to the accuracy of the centric relation. In such instances a wax check-bite[17] can be used at the time of the try-in, to check centric occlusion. This is accomplished by luting two thicknesses of beeswax over the occlusal surfaces of the lower teeth. This wax rim should be no wider than the molar teeth. The wax is softened to its complete depth. With the upper setup in place, the lower setup with the wax in position is carried to the mouth, and the patient is instructed to carry the tongue back and up against the palate, and to close his jaws. The wax is chilled and the bases removed. Examination should reveal definite imprints of the upper teeth without contact with the lower teeth. Excess wax is trimmed away until only the incisal or cusp imprints remain. The bases are returned to the articulator. If the centric relation is correct, the upper teeth will fall into these imprints. If there is any discrepancy the procedure is repeated until the centric relation is either verified or the lower base is remounted in accordance with the last check-bite. This procedure, as advocated by Schuyler, has proved very effective in checking centric relation.

ESTABLISHING CONDYLAR INCLINATION

A protrusive registration[18] is taken for the purpose of establishing condylar inclinations.

A wax rim consisting of approximately four thicknesses of beeswax is prepared. This wax rim is luted to the occlusal and mesial surfaces of the lower teeth and excess wax is trimmed away so that the rim is only the width of the molar teeth. The wax rim is softened by plunging a hot spatula into the wax to its full depth. The upper arm of the articulator is retruded a distance of about 8 mm. and the articulator is closed sufficiently so that the upper teeth make an imprint in the wax rim.

Care must be taken to obtain a straight protrusive registration without any lateral component. The baseplates with the teeth and wax are removed from the articulator and inserted in the patient's mouth. The patient is instructed to move the lower jaw forward, so that the upper teeth will be embedded in the imprints made on the articulator. After a little practice the patient will readily find the same position.

The lower setup is removed from patient's mouth and the wax is resoftened with a hot spatula, eliminating all tooth imprints and the patient is instructed to protrude the lower jaw and close into the wax in the same position as previously practiced. Upper teeth should penetrate approximately three thicknesses of the wax without making tooth contact. The wax is chilled and the setup removed.

The setup bases, locked together with the wax, are returned to the instrument. The condylar nuts are loosened and reset in the position indicated by the protrusive bite.

BALANCING OCCLUSION

The porcelain teeth are ground so that the cuspal planes will be in harmony with patient's condylar excursions as registered on the articulator. Complete occlusal balance cannot be obtained in the setup, but must be completed by returning the finished dentures to the articulator. At

17. Schuyler, C. H. Intra-oral method of establishing maxillomandibular relation. J.A.D.A. 19:1012 (June) 1932.

18. Swenson, Merrill G. Complete dentures. St. Louis, C. V. Mosby Co., p. 363.

this point the teeth can be ground without fear of disturbing their position.

It is of primary importance to return processed dentures to the articulator, so that the teeth may be ground to proper occlusion. No matter how carefully a denture is processed, some change is introduced which results in disturbance of occlusion. To attempt to correct these errors in the mouth is impractical, if not impossible. This correction can be done on the articulator in a great deal less time and much more effectively.

In instances where a partial lower denture occludes with a full upper denture, some selective spot grinding is necessary. Any premature contacts of upper porcelain teeth with the patient's own lower teeth must be removed so that protrusive and lateral excursions can be made without undue movement of the upper denture on its base.

ESTHETICS

Proper esthetics is governed by the restoration of normal vertical dimension, plus the artistic perception and ability of the dentist in selecting the proper size, mold and shade of artificial teeth[19] and the positioning of these teeth. The ridge lap of the six upper anterior teeth invariably must be set labially to the upper ridge (Fig. 6). The inclination of these teeth[20] governs not only the curve and fullness of the upper lip but also the lower lip. Certain fundamental arrangements may be followed such as toeing-in mesial corners of the central incisors and lateral incisors, in heavy, masculine types, and lapping of lateral incisors in tapering, feminine types, and establishing irregularities acceptable to the patient and to the operator.

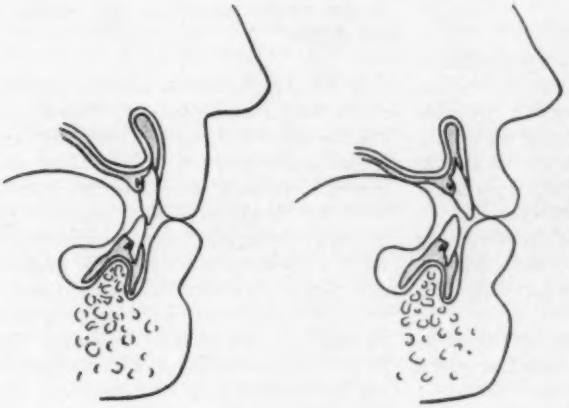

Fig. 6 • Left: Incorrect replacement of upper anterior teeth over ridge creating convex curve of lip. Right: Correct placement of upper anterior teeth. Note relaxed curvature of upper lip

SUMMARY

The replacement of teeth involving a combination of full upper and partial lower dentures must follow the basic requirements of full denture construction. These requirements are: (1) a reproduc-

19. Wright, W. H. Selection and arrangement of artificial teeth for complete prosthetic dentures. J.A.D.A. 23:2291 (Dec.) 1936.

20. Standard, S. G. Denture problems can be solved with results as predictable as fit of gold inlay. D. Survey 24:1419 (Oct.) 1948.

tion in some artificial media, usually artificial stone, of all the supporting and retentive structures of the jaws; (2) normal vertical dimension; (3) correct centric relation; (4) proper position of artificial teeth; (5) an occlusal plane in harmony with the patient's own condylar excursion and (6) esthetics.

CONCLUSION

The practical application of these requirements is essential in constructing satisfactory dentures.

1. The reproduction of the structures supporting a full denture can best be accomplished by employing an oversize plastic tray with well-defined peripheral borders. The impression material should be free-flowing so as to obtain an impression of the tissues in a static position.
2. The occlusal plane of the remaining teeth in a partially edentulous mouth, must be modified either by grinding teeth or by restorations.
3. All vertical forces applied to abutment teeth must be in the direction of the long axes of the teeth.
4. The physiologic rest position must be considered in establishing vertical dimension. The working bite should be as close to this position as function and speech will permit.
5. Centric relation is best obtained by use of the Gothic arch tracing device together with a central bearing point. The centric relation can readily be checked by the use of a wax check-bite.
7. Registration of the condylar path can be adequately obtained by the use of a protrusive check-bite.
8. Esthetics depends to a great extent on the artistic perception and ability of the dentist.

If these requirements are fully met the result should be a pleasing, efficient and comfortable full upper denture and partial lower denture, designed and constructed not only to replace the missing teeth but to preserve and maintain the health of the patient's remaining teeth and their supporting structures. A properly designed and constructed partial denture need never be considered a stepping stone toward an edentulous situation, but rather a means of supporting and retaining the remaining natural dentition.

225 West Thirty-fourth Street

The Search for Truth • The search for Truth is in one way hard and in another easy. For it is evident that no one can master it fully nor miss it wholly. But each adds a little to our knowledge of Nature, and from all the facts assembled there arises a certain grandeur. *Aristotle.*

Periodontitis and periodontosis in children and young adolescents

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Periodontitis and periodontosis are both diseases of the periodontium but their etiologies and pathoses differ. Reduced to simplest terms, periodontitis is an inflammation of the periodontium caused by injury (physical, chemical, thermal, radiant energy or parasitic) while periodontosis is a degeneration of the periodontium and the result of some more general factor. There is no reason, intrinsically, why the periodontal structures of children or young people should be immune to these inflammatory or degenerative disturbances. Probably only the factor of time—that is, less time in which injury can produce tissue changes—protects the young individual from periodontitis. Other protective influences may offer some added resistance to degeneration in the young.

There is little useful information on the prevalence of periodontal disease in young people. Chilton[1] reviewed the literature on the prevalence and age distribution of periodontal disease. He quoted Brekhus[2] to the effect that "periodontoclasia sets in after maturity and increases with age." Unfortunately, Brekhus' study and a later one by Allen[3] were based on tabulations of causes of extractions, and, therefore, record when periodontal disease was terminated, not when it started. If periodontal disease is to be treated effectively the causes must be removed before destruction occurs or before the disease has advanced to the stage where extraction is the only cure. More telling is the observation that 29.2 per cent of 500 highly selected young adults (fighter pilots) had periodontal disease[4] and Krasnow's[5] report that roentgenograms of 30 per cent of 123 children showed evidence of alveolar crest "alterations." While these data give figures far below the 85 to 95 per cent prevalence of periodontal disease often reported in adults, they do indicate that periodontal disease is important in children and young adults.

THE PERIODONTIUM IN HEALTH AND DISEASE

Without an understanding of the physiology as well as the histology of the periodontium, any discussion of periodontal disease is hazy. The periodontium serves as the touch organ of the tooth, the at-

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1. Chilton, N. W. Some public health aspects of periodontal disease. J.A.D.A. 40:28 (Jan.) 1950.

2. Brekhus, P. J. Dental disease and its relation to the loss of human teeth. J.A.D.A. 16:2237 (Dec.) 1929.

3. Allen, E. F. Statistical study of the primary causes of extractions. J. D. Res. 23:453 (Dec.) 1944.

4. Burket, L. Oral medicine: diagnosis and treatment; with a section on oral aspects of aviation medicine, by Alvin Goldhush. Philadelphia, J. B. Lippincott Co., 1946.

5. Krasnow, F. Dental clinics in progress for children's dentistry. The Mary and Leonie Guggenheim Dental Clinic, August, 1947.

tachment apparatus for the teeth and a periosteum (for the alveolar bone) and for the cementum (a modified bone). The principal fiber groups, which are made up of short, nonelastic intertwining fibrils, end in bundles of Sharpey's fibers embedding in cementum, bone, and subepithelial connective tissue. They maintain the tooth in its socket and help to keep the gingivae in proper tone.[6]

Probably the most important and most neglected phase of the periodontal membrane function is its role as a periosteum. In order for cementum to continue to function, new cementum must be deposited continuously on the surface of the old cementum.[7] This continuing deposition can take place only so long as the pericementum, or the periosteal phase of the periodontal membrane, continues to function. The alveolar bone which is on the side of the periodontal membrane opposite to its periosteal side, is like other bones. It is not static but is constantly undergoing osteoclastic resorption and osteoblastic rebuilding. When one realizes that the healthy periodontal membrane is slowly depositing new cementum on one side and new bone on the other the importance of its functions as a two-phase periosteum is evident. Anything that interferes with those activities leads to breakdown of the periodontium, exemplified by the old term "periodontoclasia."

Among the most important etiologic factors that interfere with the function of the periodontal membrane are trauma (from impinging dental restorations, calculus, food impaction, overstress on mutilated dentures and occlusal trauma), invasion by microorganisms following gingival ulceration and degeneration. Any of these may be active in the mouths of young individuals but are most likely to be operative in the mouths of older individuals because the adult has more dental restorations, develops more calculus, has more missing teeth with resultant overstress, more occlusal trauma and less resistance to invasion by parasites.

Another factor, that Glickman[8] has chosen to call the "bone factor," is important in the resistance of the young individual. Bone is an extremely plastic tissue and constantly changing. Growing bone is characterized by greater osteoblastic than osteoclastic activity. If the osteoclastic and osteoblastic activity are equal, the bone will be maintained at its given level. As soon as osteoclastic activity exceeds osteoblastic activity the bone is reduced in bulk and in functional capacity. In the young, anabolic processes usually exceed catabolic processes. This tendency to grow is characteristic also of the young periodontium where osteoblastic activity is greater. The ability of the young alveolar bone to grow and to reform is evidenced when pressure is used to remove bone on one side during orthodontic therapy while new bone is being formed on the opposite side. The strong periosteal activity of children which permits successful orthodontic treatment also resists trauma and permits repair following disease.

PERIODONTITIS

Periodontitis usually follows gingivitis. Since most gingivitis is the result of local factors, correction of those local disturbances can prevent the more destructive involvement of the periodontium. When the crevicular epithelium is broken, bacteria, which are normal inhabitants of the mouth, may invade the underlying soft tissues. Associated with the hyperemia and edema of the humoral portion of the inflammation may be osteoclasia. Progressively, the free gingival fibers, alveolar crest fibers, transeptal fibers, horizontal fibers, and oblique fibers are destroyed

6. Robinson, H. B. G. Pathology and classification of periodontal diseases. North-West Den. 29:47 (Jan.) 1950.

7. Orban, B. Oral histology and embryology, ed. 2, ch. 6. St. Louis, C. V. Mosby Co., 1949.

8. Glickman, I. Experimental basis for the "bone factor" concept in periodontal disease. J. Periodont. 20:7 (Jan.) 1949.

by edema or by loss of the attachment of their Sharpey's fibers. Whether the gingivitis results from overhanging margins of a filling, impinging orthodontic bands, from calculus, or from some other irritants, removal of the injurious agent is necessary if effective repair is to follow. Unfortunately, a gingival ulcer may heal over in a young individual and the alveolar bone crest may appear to be repaired at a reduced level. However, if the cause has not been removed, chronic inflammation may continue and the incipient periodontitis may advance to the point where tooth loss is imminent.

Control of periodontitis in young people requires good oral hygiene and carefully placed dental restorations. When the high osteoblastic activity of children is reduced, in later life, relatively mild destruction begun by impinging restorations, poor contours, and faulty contacts may be magnified and result in tooth loss. Malocclusion may be tolerated in the very young but destructive processes initiated by occlusal trauma at early ages may continue and extend, to become evident too late.

PERIODONTOSIS

Less is known of the background of periodontosis than of periodontitis. In periodontosis the activity of the periodontal membrane is reduced in a more or less uniform fashion so that the alveolar bone atrophies and the periodontal membrane widens. The defect is chiefly a reduction in the function of the periodontal membrane. Many systemic causes are cited, including diabetes, nutritional deficiency, endocrinopathies, debilitating diseases and constitutional factors. Zappler[9] has pointed out that the stress of adjustment to the endocrine upset of puberty may have profound effects on the periodontium. Sallay and Nador[10] have found evidence suggesting that kallikrein content of the saliva is four or five times greater in old age than in younger individuals and five or six times greater in patients with periodontosis than in persons of comparable age without periodontosis. What role this "prematuration" plays requires further investigation. Tenenbaum, and others,[11] investigated 17 patients under 32 years of age, all with periodontosis. From this, and previous studies, they conclude that when periodontosis occurs at an early age it is predominantly found in females. In adolescent patients it followed a definite pattern, an arc of bone being lost from the mesial surfaces of the second molars to the distal surfaces of the second bicuspids. In addition to this loss of bone around the first molars, the alveolar bone is reduced about the migrated maxillary anterior teeth. It is interesting that these teeth erupted at approximately the same time.

There are no typical pictures of children with periodontosis associated with different systemic factors. Whether the cause is diabetes, hypothyroidism, vitamin deficiency, Hodgkin's disease, disturbance of the gonadotropic hormones, or a genetic factor, the bone changes are essentially the same in all periodontoses. There is, at first, a reduction in the activity of the periosteum of the alveolar bone and cementum (the periodontal membrane) with atrophy of the alveolar bone, widening of the periodontal membrane and wandering of the teeth. Pocket formation and inflammation of the gingivae are later manifestations.

Periodontitis may be superimposed on periodontosis; for instance, in a diabetic child with calculus and faulty restorations. Similarly, periodontosis may be associated, clinically, but not pathologically or etiologically, with gingivitis or

9. Zappler, S. E. Periodontal disease in children. J.A.D.A. 37:333 (Sept.) 1948.

10. Sallay, C., and Nador, C. Changes in the kallikrein contents of saliva under physiologic circumstances and in periodontoclasia. J. D. Res. 29:232 (April) 1950.

11. Tenenbaum, S., and others. Clinical and microscopic study of the gingivae in periodontosis. J.A.D.A. 40:302 (March) 1950.

periodontitis. Local treatment is of little avail in periodontosis. The patient should be referred to a competent physician familiar with the particular disease which underlies the periodontal atrophy. In combined cases, sometimes called periodontitis complex, both local and systemic treatment is needed. Intelligently planned and carefully executed, such treatment may preserve the teeth of these child patients through adolescence and early adult life. Rather than increasing the prosthetic problem at a later stage, as suggested by some, this treatment may preserve the bone and simplify later prosthetic treatment.

Since the periodontal membrane is more active in young individuals, that is, osteoblastic activity is greater than osteoclastic, repair can be more adequate. With new cementum and alveolar bone formed, Sharpey's fibers can reattach, principal fibers re-form and bone repair may be completed. Only by accurate diagnosis, adequate treatment and careful maintenance can periodontal disease be controlled and eliminated in children as well as in adults.

SUMMARY

Periodontitis and periodontosis occur in children as well as in adults. It appears probable that approximately 30 per cent of young adults have diseases of the periodontium which started during childhood and adolescence.

Good oral hygiene, orthodontic therapy and good dental restorations are often preventives of periodontitis. Early and well executed restorative dentistry permits the periodontal membrane to repair damaged bone and cementum.

Periodontosis calls for the cooperation of the physician who controls the systemic factors and the dentist who repairs local damage. It is possible that hormonal substances in saliva may influence the bone.

Osteoblastic activity of the periodontal membrane, which is essential for good bone maintenance and repair, more often is predominant in young individuals than in older patients. Diagnosis of the periodontal disease in its early stages permits proper treatment, adequate repair and prevention of mutilated dentures.

Dentistry and the problems of today

Harold W. Oppice, D.D.S., Chicago

In a country and in a world beset with troubled times and the omens of disaster, it is good to acknowledge that the House of American dentistry is in good order. This is the result of having, and sustaining, sound principles behind which a great majority of a great profession is marshalled. It is just as much the result of an awareness on the part of the dental profession that great changes are taking place in the social, economic and scientific scenes and of the wish to plan wisely and well to meet the needs which these changes bring about. It is also the result of a refusal to accept the predictions of

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President of the American Dental Association, 1950-1951.

gloom and disaster that are so glibly made by those who are quite willing to yield a principle to the nagging and insistent demands of a moment.

The House of American dentistry is in good order and will remain so as long as it has a leadership which acknowledges that its first service is to the health of the public.

The American Dental Association has had a great, and I could say the chief, role in achieving the status which American dentistry has reached today. Even in the presence of our distinguished colleagues from abroad, who honor us with their presence here tonight, I have no hesitancy in saying that the world acknowledges the contributions American dentistry has made to the health of the public, to dental education and research, to dental organization and dental practice. These advances have only been possible because a great majority of the profession—working through the American Dental Association and its constituent and component societies—have collaborated generously with all agencies having an interest in, and a responsibility for, dental health: the dental schools, the dental examining boards, the state and community health departments, the Federal agencies, the related organizations in the field of health.

But the 75,000 dentists who compose the American Dental Association know that it is not enough today to rest with the pleasant memories of past achievements. There are still many great problems before us, problems which will require all our skill and all our ingenuity and all our wit and all our courage to solve.

DENTAL RESEARCH

The first and continuing problem of every profession is research. There is sound evidence of our leadership in the field of dental research in Washington, D. C. The National Institute of Dental Research has been established as an integral part of the great National Institutes of Health largely through the efforts of the American Dental Association. The Association's Research Fellowships at the National Bureau of Standards have been established for almost a quarter of a century and have done monumental work in the field of dental materials. The Association's fellowships at the National Institutes of Health and at the Armed Forces Institute of Pathology have made important research contributions in the biological fields. And, in compliance with the wise insistence of the Council on Dental Education in its requirements for the approval of a dental school, most of our schools today are engaged in productive and expanding programs of dental research.

There is, however, a continuing and disquieting note in dental research. In 1948, the Congress of the United States authorized the appropriation of $2,000,000 for the construction of a building to house the National Institute of Dental Research. Despite intensive efforts, these funds have not yet been made available. In recent years, the explanation frequently advanced is that the appropriation of funds cannot be made for reasons of economy or because of the demands of national defense. This explanation would seem more reasonable, indeed, to the dental profession if similar institutes had not been authorized and buildings constructed since the enactment of the dental research institute legislation three years ago. The dental profession believes that dental health is entitled to what the Congress has authorized. The Association will not be content with any program that continues to withhold needed and authorized resources at a time when such great advances are being made in the research programs for the prevention and control of dental disease.

It would be less than proper not to acknowledge publicly here tonight the assistance which Senator Robert Taft,

our guest speaker, has given to the Association in this effort to improve facilities for dental research. He was an able sponsor of the initial legislation and it is our hope that his colleagues in the Congress will soon come to the same recognition of the importance of dental research to the country.

ADVANCES IN PREVENTION AND CONTROL OF DENTAL DISEASES

Dental research has made almost unbelievable advances in the past 10 years in the prevention and control of dental caries—plain, everyday, tooth decay. The fluoridation of public water supplies, the topical application of sodium fluoride, the therapeutic dentifrices and other methods—some yet in the experimental stage—give great promise of being effective weapons in this difficult fight.

Last year this Association recommended the fluoridation of municipal water supplies when utilized in accordance with standards established by the responsible health authority and when the fluoridation procedure was approved by the local dental society. The widespread acceptance of this procedure by health authorities and by the public might well constitute a new and brilliant chapter in the field of public health. Up to the present time, more than 150 communities have fluoridated their water supplies and, within the predictable future, several hundred more will do so. The few individuals who oppose this program do so with assertions which ignore the great volume of scientific evidence which has been compiled for more than two decades. The dental profession will continue its program of urging the fluoridation of public water supplies in order to bring the benefits of improved dental health to millions of people in an economical and effective way.

The evidence on the use of therapeutic dentifrices, ammoniated and those containing chlorophyll and penicillin, is far less conclusive and the Association has been well-advised to withhold a recommendation for their general use until positive proof of definite benefits is obtained.

While efforts to prevent dental caries have become more and more rewarding, there is a much different picture in regard to the periodontal diseases—the diseases which attack the supporting structures of the tooth. These diseases, in later life, take a toll comparable to that of dental caries in the earlier years. It is wholly undesirable that teeth be saved from the destruction of dental caries in the earlier years only to be sacrificed to the periodontal diseases in maturity or early middle life. Here is one great field on which the resources and the abilities of dental research must be brought to bear.

DENTAL HEALTH EDUCATION

While the public health approach to dental diseases is becoming more and more effective, there is still no reason to neglect the role of the individual in caring for his own dentition. This is the field of dental health education. Some progress has been made in publicizing the benefits that can accrue to an individual by a markedly reduced consumption of candy, sweetened beverages and similar high-carbohydrate foods and confections. Some publicity has been given to the benefits of such simple, personal programs of prevention and control as brushing the teeth and rinsing the mouth immediately after eating. It is the job of dental health education to transform these statements into convictions on the part of millions of people in this country. New technics and new approaches, perhaps, are needed but real progress in dental health education will come only when responsibility for it is assumed—not alone by the dental profession—but by

all agencies and all individuals who have an interest in personal and community health.

PROFESSIONAL RESPONSIBILITY TO THE PUBLIC

The dental profession's responsibility to the public is not discharged solely through the development of technical methods for the prevention and control of dental disease. There is another, important responsibility which relates to the obligation of the individual dentist to the individual patient. There are those who say that the generation of today has discarded its moral guides, that a code of ethics is an anachronism—outmoded, old fashioned and designed only for those who are less than clever or have no "inside track." The dentists of this country will not accept this view. The obligation to the individual patient is never subject to a "five per cent discount" nor can it be sacrificed to the loose moral customs of a moment.

Under such circumstances, it is essential that the profession increase the safeguards which surround the relation of the individual dentist and the individual patient. The problem of handling complaints from the patient should be faced squarely, and a mechanism should be established to resolve such complaints as quickly and equitably as possible. Most complaints from patients are the result of misunderstandings and the failure to appreciate the fact that human tissues do not follow immutable and precise rules when under treatment. Most of these misunderstandings could be resolved amicably by allowing both the patient and the practitioner to present facts and viewpoints to a reviewing committee of the local dental society. Under this method, the unjustified complaint should receive the same treatment that should be accorded unprofessional conduct. Last year this Association revised its *Principles of Ethics* and restated in unmistakable language the obligation which the dentist has to his patient:

> The dentist's primary duty of serving the public is discharged by giving the highest type of service of which he is capable and by avoiding any conduct which leads to a lowering of esteem of the profession of which he is a member.

And the revised *Principles of Ethics* clearly places the problem of solving questions of ethics on the local, or component, dental society:

> Problems involving questions of ethics should be solved within the broad boundaries established in the *Principles of Ethics* by the component dental society.

During the past year the Judicial Council of the Association has made a study of mechanisms by which this obligation could be discharged by the local dental society. In its annual report to the House of Delegates this year, the Judicial Council presents the following resolution:

> *Whereas,* careful investigation by the Judicial Council reveals that many component societies have established grievance committees or regularly assign the duties usual to grievance committees to other committees, and
>
> *Whereas,* the work of such grievance committees has demonstrated their usefulness in promoting good public relations and in the avoidance of unnecessary litigation, and
>
> *Whereas,* the function of such committees should relate in the main to the amicable settlement of controversies between the patient and the dentist, therefore, be it
>
> *Resolved,* that the House of Delegates of the American Dental Association recommend to each component society the appointment or utilization of a grievance committee as recommended in the report of the Judicial Council.

I am confident that the House of Delegates will see fit to approve some resolution of this type and that the local dental societies will implement it immediately and efficiently so that the profession's relations with the public will be greatly improved and our professional obligations more adequately discharged.

GOVERNMENT AND THE DENTAL PROFESSION

In the discharge of its obligation to protect and improve the dental health of the public, it has become necessary for the profession, through the Association, to establish relations with government. Government, in the past two decades, has become more and more aware of its responsibility for aiding the improvement of public health, but the professions are fully aware that "responsibility for" should not be transformed into "control of" by sleight-of-hand legislation. In the course of attending to these relations with government, it is often necessary for the Association to send its representatives to this very beautiful and hospitable capital city to confer with members of the Congress and officials of the Federal agencies. Some of us have become fairly regular commuters and we have learned a few lessons about the ways of government. Dentistry must not stop with the provision of technical knowledge in dental health problems. It must bring this knowledge to our legislators and to our governmental administrators; it must stand vigilantly by to prevent the distortion of this knowledge to promote selfish, political objectives which are not in the interests of the public.

While our dental forebears might have decried the increasingly strong relationship that we find between government and health, it is the present generation's job to recognize that such a relation exists and that appropriate steps are taken to protect the interests of the public; even, when necessary, entering the arena of what all of us know as "politics." The dental profession makes no secret of the fact that it makes an effort to keep our legislators and administrators informed just as we, in the Association, make an effort to see that members of our own legislative body, the House of Delegates, are in full possession of the facts. To the end that the public will be served, the Association has taken an increasing interest in many problems similar to these:

1. As previously mentioned, the authorization of the Congress to construct a building for the National Institute of Dental Research has not been implemented in three years. Unless there is a more real Federal program of economy in government, equitably applied, and unless the need to remain in a war economy prevents new governmental construction, the Association intends to press a correction of this situation.

2. About twenty million Americans have been assured by law that they are entitled to, and can receive, service-connected dental care through the Veterans Administration. The dentists in the Veterans Administration and the thousands of participating dentists stand ready to fulfill the promises the Federal government has made to the men and women who have served their country in the armed services. Their ability to carry out the program has been impeded by an administrative pattern in the Veterans Administration which permits the arbitrary parceling out of funds by officials of the Department of Medicine and Surgery, without regard to the extent of the dental program, the size of current dental backlogs, or the relative needs of different sections of the country. It has been further hindered by subjecting the dental administrators to persons who are trained in other fields and whose first thoughts and loyalty are for problems arising out of their own backgrounds of medical training.

The Association has made repeated representations to officials of the Veterans Administration and has been met with statements, including some very recent assurances, that the problems were recognized and under consideration. Beyond these promises there has been no solid assurance that this serious situation would be corrected. The Association will press for a revision of these inadequate

administrative regulations and, if there is a continuation of unproductive promises, legislation will be sought.

3. The third area in which the Association and the dental profession must act is in the provision of dental care for the citizens of this country. The dental profession has valid evidence that the easy, political solution of this problem by the enactment of a system of Federal compulsory health insurance will be as costly, destructive and unscientific as the present experiment in Great Britain. When necessary, all of the resources of the profession must be used to convince our legislators that this is a totally unsatisfactory approach to the problem of improved dental health.

This political participation, even in issues which touch intimately on health problems, does not come easy for the professional man who, by vocation, is more interested in the scientific problems of his profession. But if such participation is not advanced on these vital issues of the day, the scientific, technical and professional advances, too, may soon be in jeopardy.

INTERNATIONAL DENTISTRY

A final word about a final problem: American dentistry has risen successfully to leadership in many areas of dental activity but it must be vigilant that its outlook does not grow provincial. Dental progress is being made in all parts of the world, sometimes slowly and painfully and under real handicaps, but nevertheless there is real progress. American dentists will do well to look beyond the borders of their own country to see what progress is being made elsewhere and to adapt this knowledge to their own program. The XIth International Dental Congress, which will be held in London in 1952, will provide a splendid opportunity for many of our members to exchange views with dentists from all parts of the world. It is my hope that many will avail themselves of this opportunity for American dentistry must never lose its restless desire to improve its technics for providing dental care.

CONCLUSION

Thus, while the House of American dentistry is in good order, many things must be done. These are the tasks for this generation so that those who come after us, as dentists, will have every reason to say that American dentistry, and the American Dental Association, kept faith with the problems of its own time.

1002 West Wilson Avenue

A Wider Outlook • In science, no advance is final. Every question solved produces new riddles to answer, since every higher step gives us a wider outlook and the power of seeing problems which from a lower level were not apparent. It is this, indeed, that gives to science its absorbing interest and makes it a fit occupation for a lifetime. ***Ernest Starling, quoted in "Scientific American" 185:61, October, 1951.***

COUNCIL ON DENTAL TRADE AND LABORATORY RELATIONS

Survey of the dental laboratory situation

A questionnaire was sent to the chairman of the dental trade and laboratory relations committee, or comparable committee, in each state. In those states not having a committee handling such matters it was sent to the president of the state dental society. Two reminders were sent to states which had not replied. At the time of the compilation of results of the survey, answers had been received from 38 state societies. Therefore, the report is incomplete but it does reflect the conditions in the majority of states.

It is rather difficult to state the number of dental laboratories or their employees with any exactness, owing to several factors. New laboratories are opening and others are closing daily. The number of dental laboratories and their employees is affected by the general business conditions of the country. A number of states did not answer these questions. Assuming that the number of dentists per laboratory and technician is the same in states for which no answer is available as in states for which figures were submitted, the total number of dental laboratories is approximately 5,600 and the total number of dental technicians is approximately 19,300. A statistical summary of the responses received is given in the accompanying table.

At the present time there do not seem to be too many dental laboratory technicians lost to the Armed Forces. The majority of key men in the dental laboratories are beyond the draft age. There has been some disruption of services by dental laboratories in a few communities but this has been caused mostly by these men being called back into service. Based on the states answering these questions, it is estimated that in the entire country approximately 800 technicians have been lost to the armed services since the beginning of the Korean war.

At the present time dental laboratory technicians have not been put on the list of critical occupations. To prevent any shortage of technicians in particular localities, the National Advisory Committee to Selective Service has requested state and local advisory committees to advise local draft boards regarding the deferment status of individual technicians, based on their essentiality in the community. The number of men leaving the employment of dental laboratories to go into other industries, estimated at 1,300 for the entire United States, does not seem alarming at the present time. It is only natural that a certain percentage would be attracted by the higher wages and overtime hours offered by defense industries. All business faces this condition.

From the report it can be seen that the quality of work or service has, in the main, either improved or remained unchanged. The improvement is attributed to such things as competition, progress made in the education of the dental laboratory technicians and improved technics and equipment.

There appear to be no critical shortages of materials and supplies. There are some slight delays and inconveniences;

Table • Statistical summary of responses from 38 state societies

Question[1]	Summary of answers[2]
Number of ethical dental laboratories	4,731 in 36 states (5,600 estimated in all states)
Number of dental technicians employed by ethical laboratories	10,815 in 30 states (19,300 estimated in all states)
Number of technicians lost to Armed Forces since middle of 1950	205 in 22 states (800 estimated in all states)
Number of technicians lost to other industries since middle of 1950	286 in 19 states (1,300 estimated in all states)
Change in quality of work or service by laboratories since middle of 1950	29 no change; 6 better; 2 worse
Shortages of dental materials reported since mid-1950	8 yes; 28 no
Shortages anticipated in 1951	9 yes; 26 no
Existence of state dental laboratory associations	30 yes; 8 no
Number of laboratories belonging to state laboratory associations	1,495 in 26 states
Number of technicians employed by member laboratories	6,086 in 22 states
States having Accreditation Plan in operation	5 yes; 33 no
States interested in establishing Accreditation Plan	9 yes; 19 no
States with laboratory associations interested in establishing Accreditation Plan	6 yes; 20 no
States contemplating inaugurating Accreditation Plan	5 yes; 19 no
States having other plans for inspecting, rating or approving laboratories	3 yes; 33 no
States where other plans have been suggested by state dental society	13 yes; 22 no
States where other plans have been suggested by laboratories	16 yes; 20 no
States contemplating inaugurating other plan	7 yes; 26 no
Position taken by state society regarding licensing and registering of laboratories or technicians	0 favor; 22 oppose (1 favors registering but not licensing laboratories)
Position taken by laboratories regarding licensing and registering of laboratories or technicians	7 favor; 10 oppose
Legislation introduced or scheduled to be introduced concerning laboratories and technicians	12 yes; 25 no
States having association of laboratory technicians	10 yes; 27 no

1. Not all questions were amenable to statistical tabulation.
2. Number of tallied answers to questions is usually less than 38 because some states gave equivocal or indeterminate answers and other states gave no answer.

there may also be some shortages where a manufacturer has increased his business far above what he did in 1950. Even though he was on a 100 per cent allotment for 1951 he could not meet any increased demand for his products.

The dental laboratory craft has a state laboratory association in most states with which the state dental society can work out mutual plans for cooperation and study any problems which may arise. In at least 10 states the dental laboratory technicians also have associations.

Five of the 38 states replying had the Accreditation Plan in operation; nine other states are interested in promoting the plan. The Accreditation Plan was revised and put at state level in January 1951. It is rather early to predict how many more states will inaugurate the plan.

Seven states contemplate inaugurating plans other than the Accreditation Plan, and three reported having other plans in operation. Even though the Accreditation Plan is unacceptable to them, the need for some plan of cooperation is evident and steps are being taken to achieve this goal.

No state dental societies are in favor

of licensing dental laboratories or dental laboratory technicians. One state favored registration of laboratories without licensure. In a majority of states reporting on this question, dental laboratories were also opposed to licensing, although 12 states reported legislation either introduced or scheduled to be introduced concerning dental laboratories and technicians.

From the comments on the questionnaires it appears that the relationship between the dental profession and the dental laboratory craft is improving rapidly. In most states members of the dental laboratory associations are admitted to sections of the annual meetings of the state dental societies. Programs are being given by some societies for the further education of dental laboratory technicians. It is believed that these programs should be continued and expanded in all states.

Some states expressed criticism of the illegal practice of dentistry by a few dental laboratories. The belief was that this is owing to the lack of enforcement of the present dental practice acts, and does not necessitate the passing of any new laws.

F. W. Herbine
Chairman

COUNCIL ON DENTAL EDUCATION

Additional dental internship and residency programs approved and preceptorship defined

The Council on Dental Education and its Committee on Dental Internships and Residencies have reviewed the applications from a number of hospitals for approval of their educational programs. These hospitals have had their dental departments approved by the Council on Hospital Dental Service and the inspectors of that Council have inspected the educational program and facilities of these hospitals. These inspectors have reported on the manner in which these programs agree with the Requirements for the Approval of Hospital Dental Internship and Residency Programs developed by the Council on Dental Education and approved by the House of Delegates of the American Dental Association.

The Council on Dental Education and its Committee on Dental Internships and Residencies voted at the meeting held at Chicago on July 6, 1951, to approve the educational programs in the hospitals listed in the table. The area or areas for which approval has been given, as well as the type of program, are also indicated.

DESCRIPTION OF A PRECEPTORSHIP

The requirements of the Council on Dental Education for the approval of Examining Boards in Dental Specialties includes certain specifications relative to the qualifications of candidates. The educational requirement calls for a period of study after graduation from a dental school of not less than two years in graduate or postgraduate courses, or in hospitals, clinics, dispensaries, preceptorship training programs, or in fundamental science laboratories recognized by the Council and by the specialty examining boards as competent to provide

Table • Hospitals and programs which have been approved

Hospital	Type of program	
	Internship	Residency
U. S. Public Health Service Hospital Stapleton, Staten Island New York 4, New York R. H. Moore, D.D.S., Dental Administrator	Rotating Endodontia Operative Oral surgery Periodontia Prosthodontia Radiology	
Mt. Sinai Hospital of Cleveland 1800 East 105 Street Cleveland, Ohio Ed. Reiter, D.D.S., Dental Administrator	Straight Oral surgery	Straight Oral surgery
U. S. Public Health Service Hospital Larchmont Norfolk, Virginia Wm. C. Neaf, D.D.S., Dental Administrator	Rotating Oral surgery Children's dentistry Anesthesia Oral pathology Prosthodontia Periodontia Endodontia Radiology Tumor clinic	
U. S. Naval Hospital Portsmouth, Virginia Jos. L. Purcell, D.D.S., Dental Administrator	Rotating Oral surgery Anesthesia Oral pathology Prosthodontia Periodontia Endodontia Radiology	

adequate training in the special field. This period of study may be pursued wholly in a school giving graduate or postgraduate courses and may or may not lead to an advanced degree; it may also be pursued wholly in hospitals, clinics, dispensaries, preceptorship training programs, or in fundamental science laboratories; or it may be pursued partially in schools or preceptorship training programs and partially in other types of institutions.

The Council, at its meeting on July 7, 1951, approved a description or definition of a preceptorship which is as follows:

A preceptorship training program for the purpose of educating and training potential applicants for the dental specialty board examinations should meet the following requirements:

1. The program of study must be one that has been planned in advance with special reference to the applicant's previous training and experience and should have as its main objectives and aims that of providing the applicant with the additional skill and knowledge required by the board concerned.

2. The program must be supervised by one who gives much more than casual attention to the educational program of

the applicant. Moreover, the program must be under the direct supervision of a specialist who has been officially designated by the specialty board to act in this capacity. The supervisor need not be a diplomate of the board but he should be selected on the basis of his particular skill and ability not only as a specialist but as an educator and teacher.

3. The physical facilities and equipment and apparatus for conducting the educational program must be adequate for the particular training program that is to be conducted. A description of these facilities should be supplied to the board in question and should have been approved by the board before the training program is undertaken.

4. The board should require a report and statement from the supervisor of the program at its completion. The board should also require a written report from the applicant describing in considerable detail his program of study and his conclusions along with an adequate bibliography.

It should be noted that the use of preceptorship type of training is recognized by the Council but it is left to the individual boards whether they wish to recognize this type of educational preparation. At this time, most of the boards indicate that they will recognize preceptorship training as fulfilling a part of the educational requirements.

COUNCIL ON DENTAL HEALTH

Community dental health programs in the United States: results of a survey

The American Dental Association has long believed that the approach to the problem of improved national dental health must be made largely through the development of community dental health programs. Both tradition and experience have demonstrated that needs can best be determined and met through individual and community efforts. Those efforts, directed through community-centered activities, have the design and endurance that are needed for such continuing endeavors as the improvement of the dental health of the nation.

Community dental health activity in the United States probably started in 1791 when the first clinic for the treatment of the poor was established in New York City. A second dental clinic was started in 1849 by the dental surgeons of New York State, and this was followed shortly thereafter by similar undertakings by the dental surgeons of Philadelphia and Boston.[1]

Additional dental health programs, primarily for the purpose of providing clinical dental care for the poor, grew at an increasing rate during the next 85 years. Many of the programs were supported by philanthropists, others by tax funds. Programs frequently were aided by services given gratuitously by dentists, facilities supplied by manufacturers of and dealers in dental equipment, and funds provided by voluntary agencies.

1. Salzmann, J. A. Principles and practice of public health dentistry. Boston, The Stratford Co., 1937, p. 44.

Gradually more and more community-centered activities got under way, until in 1937 over 300 cities of 25,000 or more population and hundreds of smaller communities had established school dental health programs.[2]

The greatest growth in the development of community dental health programs, however, has occurred since the enactment of the Federal Security Act of 1935. This growth has been possible because the dental profession has been able to put to good use the 100 and more years of experience it had gained in dental public health.

Federal grant-in-aid funds to state health departments provided for an expansion of consultative services to local health departments and communities, and dentists trained in public health were employed to aid in the development of local dental health programs. With the assistance of trained and experienced public health dentists and the continuing support and advice of dental societies, community-centered dental health activities have grown far beyond the almost futile short range objective of dental treatment for the indigent. The programs are based on dental health education designed to motivate people to assume personal responsibility for health. They also are attacking the problem through an increased use of known preventive measures.

THE SURVEY

Purpose • In 1949, the Council on Dental Health recommended that a study of community dental health programs be undertaken for the purpose of obtaining current information on the number of programs and types of activities being conducted. Such information is important if the Council is to fulfill its duties as outlined in the Association's *Bylaws*, which read in part:

> To conduct a study of the oral health needs of the public and of plans to meet such needs; to formulate programs for promoting oral health. . . . To assist constituent and component societies in the development of oral health policies and programs within their jurisdiction.

From 1936 to 1939, the Cleveland Child Health Association published the results of a comprehensive survey of dental health programs for school children in United States cities with populations exceeding 25,000.[2] The summary, consisting of six volumes, gives brief descriptions of dental programs in 370 cities, including about 41 per cent of the population.

The Council was of the opinion that another such survey might be advisable but that it was neither practical nor necessary to duplicate the survey at the present time. Consequently, a more general type of study was undertaken.

Method • The Council wrote to nearly 1,200 state, city, county and district health officers requesting their assistance in supplying data on dental programs in their respective areas. The mailing list was secured from the American Public Health Association and it was assumed that it included practically all health officers employed either on a full-time or part-time basis. It was further assumed that public health officers should be aware of all dental health programs in their respective areas and could either describe the programs or refer the request to someone who could.

A few months later, a second letter was sent to those persons who had not replied and a questionnaire to be used as a guide in reporting was enclosed. Approximately a 60 per cent response was obtained.

Since the information in most instances was general, it was difficult to summarize the various activities. However, 24 gen-

2. Cleveland Child Health Association. A survey of mouth hygiene programs for school children. 5 volumes. Mouth hygiene for Cleveland school children. 1 volume. 1936-1939.

eral categories into which most of the information could be classified were selected. The next step was to classify the information according to states and to send it to the respective state dental directors. The dental director was asked to compare the figures for his state with information available to him.

Preparation of Summary • The data reported in the accompanying table were verified by the state health departments in all but five instances. A few states are not listed because too little information was received.

In 13 of the 24 general categories, there was sufficient information to warrant publication of results.

Most of the information is presented on the basis of number of communities. For purposes of this survey, a community was regarded as a village, town or city. Although an attempt was made to determine the number of communities participating in specific health activities, sometimes the information was submitted on the basis of institutions or geographic areas instead of communities. Consequently, no attempt was made to total the number of places in the United States in which an activity was being conducted. For purposes of comparison, the total number of counties and of post offices in each state is included.[3,4]

Usefulness of Data • Although the 60 per cent response to the questionnaire is exceptionally high, the data do not present an accurate picture of dental health activities in the United States. The information would have been much more meaningful had it been available in terms of percentage of population covered, relative amount of emphasis and time given to the various activities, effectiveness of measures used, or on other more nearly comparable bases. The survey does serve, however, to give an over-all picture of dental health programs and allows for some speculation as to the relative amount of emphasis given to various activities.

Besides the material presented in the table, many other phases of dental public health programs and many unusual and apparently successful activities were reported. Although the detailed information will aid materially in the work of the Council, only the 13 areas of activity listed lent themselves to this type of tabulation. Perhaps this partial report will promote the submission of additional information to the Central Office.

COMMENTS ON ACTIVITIES REPORTED

Some Type of Program • Credit was given under this classification when there was some specific activity in the field of dental health that had a semblance of being on an organized and continuing basis. In most instances the program was sponsored by the community; however, in some areas local services were supplied by the state health department.

Instruction in Schools • If the person reporting regarded the dental health instruction as a significant contribution to the dental health effort, the community or school was included in this classification.

Training for Teachers and Nurses • An attempt was made to determine how many communities were making specific provisions for dental health training for teachers and nurses. If dental health education in the schools and the community is to be effective, special attention must be given to pre-service and in-service training for teachers and nurses to help them become familiar with authentic information on dental health, avail-

3. United States Official Postal Guide, July 1949. Washington, D. C., U. S. Government Printing Office, 1949, p. 112.

4. U. S. Department of Commerce, Statistical Abstract of the United States, 1950. Washington, D. C., U. S. Government Printing Office, 1950, p. 349.

able sources of dental health education materials, and the community facilities available for dental health care.

Referral with Inspection • This section includes those localities in which dental inspections of children are conducted in the schools by dentists or dental hygienists. Following the inspections, notices are sent to parents informing them of the findings.

Almost since the beginning of public health programs, a cardinal method for the mass control of disease has been a procedure known as "case finding and follow-up." The control of tuberculosis, venereal disease, hookworm, cancer and other diseases is dependent primarily on finding the individuals so affected and instituting a follow-up procedure to insure treatment. The principles of case finding have been applied, with varying degrees of success, to the problem of dental caries.

It should be pointed out that school inspections cannot be regarded as complete examinations. The statement entitled "Guide for Determining Need for Dental Inspections in School Health Programs," approved in 1951 by the House of Delegates of the Association, may serve as a guide in determining the possible benefits and limitations and the possible undesirable effects of such a program.

Referral Without Inspection • In the card referral system, the child is given a card by his teacher as a part of the over-all dental health teaching program. The card usually carries a message addressed to the child or his parents, requesting that the child go to his family dentist for an examination and the necessary dental treatment. There is also a space for the dentist's signature when all the necessary dental service has been completed. The signed card is then returned to the school and is used as one criterion of the success of the teaching program. The card referral system, when properly administered, is helpful not only in evaluating the program but also in promoting personal initiative on the part of the child and parents for regular dental examinations and care.

Topical Fluorides • In several communities topical fluoride applications are provided for groups of children on a public program basis. A count was made only of those communities that were sponsoring their own program or were benefiting from state sponsored programs on a continuing basis. No attempt was made to count the number of communities in which the topical fluoride demonstration program of the U. S. Public Health Service has operated.

Fluoridation • The figures in the table represent the number of communities that were actually adding fluorides to their public water supplies as of July 1, 1951.[5] Hundreds of additional communities are seriously considering the procedure, many have approved the project, and many actually have purchased equipment. In addition to the states reported, fluoridation was under way in one community in each of the following states: Delaware, Idaho, South Dakota and Wyoming.

Public Financed Dental Treatment • Dental care is sometimes financed from tax funds or by voluntary contributions in order to provide dental services to those persons who are unable to secure care through private means. For example, in some rural areas transportable equipment and dental trailers are used to bring dental services to those persons who do not live conveniently close to private dentists. Sometimes private practitioners do not provide enough dental services for

5. American Dental Association. Fluoridation in the prevention of dental caries, ed. 2, 1951.

Table • Dental health activities in the United States, 1950*

States reporting	Post offices	Counties	Some type program	Instruction in schools	Teacher-nurse training	Referral with inspection	Referral without inspection
Alabama	905	67	33[a]	10[a]	1	0	†
Arizona	263	14	4	2	†	3	†
Arkansas	1,089	75	5	2	†	3	†
California	1,434	57	38	13	†	14	†
Colorado	562	62	6	1	†	16[a]	1
Connecticut	293	8	144	38	†	105	†
Florida	660	67	17	5	1	9	†
Georgia	900	159	100	†	40	†	†
Illinois	1,459	102	44	34	11	35	†
Indiana	899	92	75	57	5	47	1
Iowa	1,103	99	[b]	[b]	15	1[a]	[b]
Kansas	911	105	105[a]	105[a]	12	2,653[c]	2,435[c]
Kentucky	2,203	120	48	48	10	41	0
Louisiana	747	63	17	8	†	12	†
Maine	674	16	63	30	0	31	0
Maryland	551	23	23[a]	3[a]	†	13[a]	†
Massachusetts	571	13	217	171	1	156	15
Michigan	1,016	83	65	97	48	26	0
Minnesota	1,035	87	354[c]	415[c]	49[c]	173[c]	219[c]
Mississippi	728	82	56	50	2	56	0
Missouri	1,467	114	66[a]	112[a]		15	1
Montana	544	56	51[a]	51[a]	16[d]	2	51[a]
Nebraska	668	93	7		11[d]	7	63[a] 300[e]
Nevada	125	17	21	21	0	9	0
New Hampshire	334	10	94	78	10	†	0
New Jersey	626	21	321	†	†	176	†
New York	1,924	57	20	17	†	†	†
North Carolina	1,130	100	44	44	†	44	†
North Dakota	601	53	11	31	9	34	†
Ohio	1,333	88	37	10	1	16	†
Oklahoma	861	77	16	3	1	4	†
Oregon	595	36	10	7	1	5	†
Pennsylvania	2,402	66	2,525[c]	2,525[c]	2	2,525[c]	0
Rhode Island	80	†	32	17	2	39	†
South Carolina	496	46	12	4	†	6	†
Tennessee	800	95	27	11	4	11	1
Texas	1,993	254	33	39	10	50	†
Utah	292	29	40[a]	550[c]	†	60	125
Virginia	1,704	100	22	2	1	4	†
Washington	692	39	13	9	3	10	4
West Virginia	1,527	55	11[a]	4[a]	†	2[a]	1[a]
Wisconsin	926	71	96	20	5	10	72

*Figures refer to number of towns, villages and cities, except as indicated by the following designations:
a. Counties.
b. All rural schools in 86 counties, 420 town schools, 96 parochial schools.
c. Schools.
d. Hospitals and universities.
e. School districts.

the children in their community to meet the demand.

Probably the greatest demand for public financed dental care stems from economic factors. Some families actually do not have sufficient income to pay for dental care. In other instances, a lack of appreciation of the importance of dental health and a resulting imbalance of expenditures results in neglect. The latter circumstance calls for an effective educational program designed to moti-

Topical fluorides	Fluoridation	Public financed treatment				Priority services for children	Evaluation of program
		Localities	Private offices	Clinics	Mobile equipment		
3	1	20	5	20	10	1	4
†	0	3	1	1	6	2	†
†	1	4	1	2	†	†	†
3	0	24	7	11	6	2	4
1	1	12	2	3	0	0	5
63	4	75	45	13	6	51	45
1	1	12	1	8	3	†	1
8	2	47	†	40	2	47	†
28	1	26	11	18	24	4	8
7	0	9	38	7	1	5	52
†	0	2	†	1	†	†	[b]
1	1	3	105[a]	†	1	†	68
12	2	38	10	8	20	†	†
3	0	7	†	2	1	1	†
34	0	26	16	5	26	3	0
†	0	23[a]	23[a]	5[a]	13[a]	4[a]	13[a]
77	2	134	57	140	9	103	135
61	10	30	7	30	18	7	3
14[c]	4	22[c]	76[c]	23[c]	22[c]	22[c]	69[c]
8	0	56	55	3	2	56	†
5	0	9	0	6	5	6	7
1[a]	0	2[a]	1[a]	2[a]	2[a]	2[a]	42[a]
3	1	2	0	2	0	0	†
2	0	21	10	2	19	1	2
94	1	16	16	2	63	16	63
235	1	307	79	30	64	220	†
17	1	14	5	14	14	12	12
44	1	44	†	†	44	44	†
5	0	5	†	†	†	†	†
4	1	21	6	12	5	2	3
2	0	11	9	4	†	†	†
†	0	2	2	†	†	10	†
45[c]	0	174[c]	2,525[c]	174[c]	0	†	2,525[c]
16	0	23	5	18	0	23	5
1	2	2	†	2	†	1	†
5	2	16	12	†	3	1	2
33	4	33	6	12	6	11	†
6	0	3	6	2	19	†	†
25	0	25	2	6	19	†	3
5	1	39[a]	39[a]	2	1	39[a]	3
11[a]	3	11[a]	5[a]	5[a]	3[a]	11[a]	†
3	53	18	3	11	†	2	18

†Information not available.

Note: The figures for some states appear to be inconsistent. For instance, some states show a greater number of communities with "instruction in schools" than with "some type program." These inconsistencies probably result in most instances from misinterpretation of the questions.

vate the family to assume personal responsibility for health.

Localities • This section includes those localities in which provision is made for public financed dental care. These figures, however, do not give a good indication of the amount of care provided. In some communities there might be provision for some emergency care for 2 of every 100 persons actually eligible for it or the proportion could as well be 50

of every 100 persons. Rarely, if ever, does the amount of care equal the amount of need felt by the community. In most instances, public financed dental care is acknowledged primarily as a temporary expedient serving a useful purpose until better mass control measures are developed.

Private Offices • In some communities dentists have cooperated with community health and welfare agencies in the development of a plan whereby eligible children are given service in private dental offices. Under this plan, dentists usually are paid on a fee-for-service or on an hourly basis.

Clinics • This classification shows the number of places in which public financed dental care was provided in central clinics. An accurate evaluation of the extent of service provided is difficult. In some large cities there are several clinics, but the city was counted only once. On the other hand, a clinic in a smaller community might be used for only a half day each week.

Mobile Equipment • In this section is included the bus or trailer type clinic in which dental equipment is permanently installed. Also included in this category is what is generally called "transportable equipment" which may be dismantled and moved easily from place to place. Mobile or transportable equipment is most generally used in rural areas where central clinics would not be easily accessible to the population.

Priority Services for Children • Included in this category are those places in which special emphasis was given, in the treatment program, to priority for the youngest age group for whom complete care can be provided.

Where funds, personnel and treatment facilities are insufficient for a complete program for all eligible children, some priority classification is necessary for a systematic approach to the problem. Such priority plans can be enlarged in future years by maintenance care for the initial group, with new groups being added as rapidly as resources will permit. Just as an individual should begin dental care early and continue it on a regular basis, so should clinical programs be based on some similar system.

Evaluation of Program • The figures in this section indicate the approximate number of programs in which specific attention is being given to evaluation of results.

Many dental health programs have been in operation for years in an attempt to solve an almost overwhelming problem without anyone ever knowing what degree of success was being achieved. Community dental health programs can be evaluated on such bases as a comparison of need with the percentage of children receiving complete care, the number of fillings and the number of teeth saved as a result of timely care and preventive measures. Evaluation is possible only when the program is designed and administered with this purpose in mind. A dental health program will be supported by the public when the results of periodic evaluations are interpreted to the community in terms that are interesting and understandable.

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Editorials

American Medical Association Councils report favorably on fluoridation of water supplies

Although considerable evidence has been compiled during the past several years which strongly indicates that the fluoridation of communal drinking water reduces the incidence of dental caries, some communities hesitate to adopt the procedure. Opponents of the process argue, despite lack of supportive evidence, that the addition of one part per million of fluoride to drinking water might produce serious systemic disorders. Such apprehension should be allayed by a joint statement recently released by the Council on Pharmacy and Chemistry and the Council on Foods and Nutrition of the American Medical Association. This statement, published on page 733 of this issue of THE JOURNAL, states that the Councils are:

> . . . unaware of any evidence that fluoridation of community water supplies up to a concentration of one part per million would lead to structural changes in the bones or to an increase in the incidence of fractures. The only difficulty so far revealed is a possible increase in mottling of the tooth enamel. . . . After considering the evidence available at this time, the Councils believe that the use of drinking water containing up to one part per million of fluoride is safe.

The Councils also agree with previously expressed opinions of the American Dental Association that daily users of such water should not subject themselves to additional fluoride intake from other sources such as bone meal and fluorine containing lozenges, dentifrices and chewing gum.

When this newest method of controlling dental caries began to show promise, dental, medical and public health officials recognized that both the efficacy and the toxicity of the process had to be determined and that both the dental and the medical

professions had definite responsibilities in making such determinations. Dental investigators long since have determined that the process is effective. Medical investigators now have confirmed that it is harmless. Since the bones and the teeth are more sensitive to fluoride effects than are soft tissues and since investigators have found no evidence that the skeletal structure of persons who have used fluoride-bearing water for years is affected, it appears that the arguments regarding the toxic effect of the approved water fluoridation process are extremely tenuous. Opponents of the process now will have to conceive new reasons for preventing the installation of this simple and inexpensive dental health measure.

The American Dental Association, the American Association of Public Health Dentists, the United States Public Health Service, the Governing Council of the American Public Health Association and the State and Territorial Dental Health Directors have recognized the value of fluoridation as a preventive for dental caries. The American Water Works Association recently reaffirmed its position in the matter (see news section of this issue of THE JOURNAL). Now that the American Medical Association, through the actions of two of its important councils, has expressed its views regarding the nontoxicity of the procedure, no community need harbor misgivings about installing an approved water fluoridation process. On the contrary, since the dental benefits of the process are so well established, authorities who refuse to adopt the measure will have difficulty in justifying their position.

The advent of radioactive compounds opens new fields for the dental scientist

New light on the long debated question as to which type of filling material provides the best marginal seal is furnished by Armstrong and Simon on page 684 of this issue of THE JOURNAL. By using a radioactive calcium chloride solution they tested the marginal seal of recently placed gold inlays and fillings of amalgam, gold foil, silicate and autoset resins and found that all types of fillings admitted calcium at the margin. The investigators found further that the radioactive calcium actually penetrated portions of the most carefully inserted gold foil and silicate restorations.

In another article on page 664 in this issue Wainwright, reporting on a similar study in which the same test solution was used, found that previously existing silicate fillings in freshly extracted teeth were completely permeated by the radioactive calcium in a relatively short time. Both groups of investigators found the dentin surrounding the silicate fillings to be penetrated to a depth of about one-half millimeter after application of the radioactive solution for periods of 5 minutes to 48 hours.

At first glance such findings seem contrary to the success obtained by dentists in preventing a recurrence of caries through the use of carefully inserted restorations. Perhaps the answer lies in the fact that different types of test substances differ in their ability to penetrate the sealed margins of fillings. Earlier investigators were limited to the use of colored solutions in testing the immediate penetrability of fillings and dental structures. Their investigations necessarily were inconclusive because the relatively enormous dye molecules can enter only relatively large spaces. The

advent of radioactive compounds opens up a broad new field for the dental scientist by permitting him to employ as tracers substances which occur normally in and around the teeth. Compounds can be synthesized with radioactive carbon, hydrogen and hundreds of other appropriate isotopes to make tracers. These radioactive compounds can be used to test the penetration, transportability and metabolism of any substance of dental interest. Among the substances already available in radioactive form are penicillin, sodium iodide, thiamin, urea, gold, copper and water.

The availability of large numbers of radioisotopes has been made possible by the powerful neutron beam of the uranium pile. Dental scientists, however, did not wait for the developments at Oak Ridge before using radioisotopes in dental research. The foundation for the present work in this field was made with cyclotron-produced isotopes by early investigators[1] including Volker, Hodge, Armstrong, Manly, Bale, Soggnaes, Bibby, Wasserman, Blayney, Groetzinger, DeWitt, Chievetz, Hevesy, Erbacher and Wannenmacher.

It has been stated that some dental investigators hesitate to use these new atomic tools because of the detailed knowledge required and the radiation hazards involved. To help overcome this hesitancy the Association has appointed an atomic energy subcommittee of the Council on Dental Research headed by J. L. T. Appleton. This committee is preparing a résumé on sources of information, precautions against radiation hazards, and a list of dental atomic investigators. This and other information compiled by the committee will be published in THE JOURNAL. In addition the First District Dental Society of New York has established an atomic energy committee which has sponsored two atomic energy issues[1,2,3] of the *New York Journal of Dentistry.*

Radioisotopes enable the investigator to trace the movement and localization of medicaments and biologic compounds with precision and accuracy a million times more decisive than is possible by ordinary chemical methods. Because of the minute and slow nature of many dental changes, information regarding the action and safety of dental materials can, in many instances, be obtained by no other method.

One of the major responsibilities of dentistry now is to establish a program of synthesis of radioactive compounds of dental interest so that these new tools can be employed for the improvement of dental service.

1. Dental applications of atomic energy. New York J. Den. 20:280 (Aug.-Sept.) 1950.
2. Atomic energy and dentistry. New York J. Den. 21:284 (Aug.-Sept.) 1951.
3. Copies of the two atomic energy issues of the New York Journal of Dentistry may be obtained at fifty cents each from the First District Dental Society of the State of New York, Hotel Statler, New York 1.

Professions unite to increase defense bond purchases

The American Dental Association joined with several other professional organizations last October to form a National Professional Associations Advisory Committee for Defense Bonds. This new committee will act in an advisory capacity to the United States Treasury Department and, in addition, it will solicit the aid of pro-

fessional people in the gigantic defense program made necessary by present international conditions. Harold W. Oppice, immediate past president of the Association, has been appointed bond chairman for dentistry. Dentists and members of other professional groups are being requested to participate in a simple savings plan which consists of investing in one defense bond per month. Details of the plan are outlined on page 745 of this issue and explained more fully in a letter which Dr. Oppice is mailing to each member.

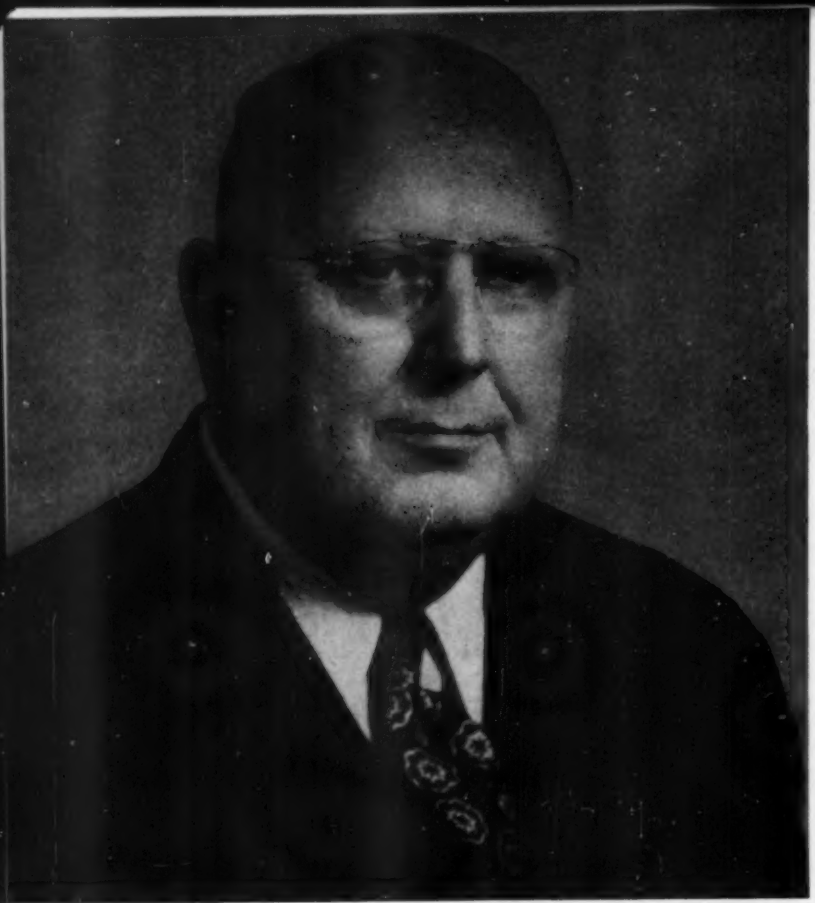
It is not necessary to press the urgency of this program. From the standpoint of both national and personal interest the plan is practical. The clouds of war grow grayer month by month. Millions of men are in military service and billions of dollars are being poured into armaments. More men and more money will be required to insure an adequate defense and assure an early and lasting peace. More money invested in defense bonds means less taken in taxes. Throughout the history of this country members of the dental profession, like other patriotic citizens, have furnished their full share of manpower and money to protect the interests of the nation. They will continue to do so. Most dentists, long since, have established a defense bond buying program; a few have not. The plan advocated by the professions' Advisory Committee for Defense Bonds will enable every dentist to increase his monthly savings systematically and aid in defending his home and country against the invasion of foreign forces. Every member of the profession is urged to determine how much he can save, what type of bond best fits his needs, and to arrange with his bank for the automatic purchase of a bond a month.

Fluoridation of drinking water harmless: statement by American Medical Association

The Council on Pharmacy and Chemistry and the Council on Foods and Nutrition of the American Medical Association, on November 12, issued a joint statement regarding the fluoridation of community water supplies. In the opinion of both Councils the addition of one part per million of fluoride to drinking water under approved methods of control is harmless. Other organizations which have approved the process for the purpose of reducing the incidence of dental caries include the American Dental Association, the United States Public Health Service, the American Association of Public Health Dentists, the Governing Council of the American Public Health Association and the State and Territorial Dental Health Directors. The attitude of the American Water Works Association is published on page 753 of this issue of THE JOURNAL. The statement of the American Medical Association follows.

The Council on Pharmacy and Chemistry and the Council on Foods and Nutrition of the American Medical Association have been requested to state their opinion regarding the safety of fluoridation of water supplies, a procedure which now has been adopted by more than 140 cities.

The Councils are unaware of any evidence that fluoridation of community water supplies up to a concentration of one part per million would lead to structural changes in the bones or to an increase in the incidence of fractures. The only difficulty so far revealed is a possible increase in mottling of the tooth enamel. From the available evidence based on thousands of observations the incidence of mottling of the enamel in children who drink water containing fluoride up to a concentration of one part in a million is minimal and detectable only by careful dental examination. It occurs only in a small percentage of children and is so slight as not to present a problem from the point of view of appearance or strength of the teeth. Evidence of toxicity other than the effect on enamel has not been reported in communities where the water supply has several times this concentration. After considering the evidence available at this time, the Councils believe that the use of drinking water containing up to one part per million of fluoride is safe. However, the use of products which are naturally high in fluoride content, such as bone meal tablets, or of lozenges, dentifrices, or chewing gum, to which fluoride has been added, should be avoided where the drinking water has been fluoridated. In places where children are subjected to warm temperatures and consequently drink large amounts of water, a lower concentration of fluoride may be necessary to avoid mottling.



LeRoy M. Ennis, who assumed the presidency of the Association on October 18, 1951, was born in West Chester, Pa., on January 9, 1893. He obtained his elementary education in West Chester, his secondary education in Philadelphia, and his dental education at the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, where he was graduated in 1916. Early in his professional career he became interested in roentgenology and has devoted the greater part of his life to teaching that subject. He was instructor in oral surgery at the University of Pennsylvania from 1917 to 1919 and instructor in roentgenology from 1919 to 1930. In 1930 he became assistant professor of roentgenology at his university and was made full professor of oral roentgenology in 1943, a position which he holds at the present time. He also is professor and director of the course in oral roentgenology, Graduate School of Medicine, University of Pennsylvania. He has served as president of the Philadelphia County Dental Society and of the Pennsylvania State Dental Society. He is secretary of the American Academy of Oral Roentgenology and has been secretary of the Association's Section on Roentgenology of which he was also a founder.

He has appeared on numerous programs of the American Dental Association and its constituent and component societies and on programs of the Canadian Dental Association and its branch organizations. In 1946 he was a member of the Ivory Cross Expedition to the Netherlands and in 1951 he was a member of the Mission to Japan, both of which were organized to aid dentists in their respective countries.

He served as a member of the House of Delegates of the Association for twenty years and as a member of the Board of Trustees from the Third District from 1944 to 1950. During World War I, Dr. Ennis served two years in France in the Dental Corps of the First Division, U. S. Army, and until 1934 held a captain's commission in the Army Reserves. From 1934 to 1945 he was a lieutenant commander in the Naval Reserves. He is consultant radiologist to the Army, Navy, Veterans Administration, Public Health Service, and the University of Pennsylvania Hospital.

Ernest G. Sloman, speaker of the House of Delegates

Otto W. Brandhorst of St. Louis was elected president-elect of the Association at its ninety-second annual session held in Washington, D. C., October 15-18, 1951. He will assume the duties of president at the close of the ninety-third annual session in St. Louis next year. Dr. Brandhorst was born in Nashville, Ill., on March 29, 1889, and was graduated from Washington University School of Dentistry in 1915. As a teacher, administrator and specialist in orthodontics he has served the dental profession actively and well for many years. He has been president of the St. Louis Dental Society and the Missouri State Dental Association, and editor of the Journal of the Missouri State Dental Association. In 1935 he served on the Dental Advisory Council to the Committee on Economic Security and in 1945 he was consultant on dental study for the Bureau of Research and Statistics, Social Security Board. He is a member of the Council on Dental Education of the American Dental Association, serving as chairman of two of that Council's committees, the Committee on Training of Dental Hygienists and the Committee on Inspection Forms. He has served for many years on the House of Delegates of the Association and has been secretary of the American College of Dentists since 1935. He has contributed liberally to dental literature and has appeared on scientific programs of many dental societies throughout the country. Since 1945 he has been dean of Washington University School of Dentistry.

Washington News Letter

Results that are encouraging, though not yet conclusive, in the development of standards for measurement of dentofacial deformities have been reported by Walter J. Pelton, chief of the Division of Dental Resources in U.S. Public Health Service. Upon his return to Washington in November from a three-week field study conducted in Idaho, Dr. Pelton informed THE JOURNAL'S Washington correspondent that the anthropometric system which was tried out in Idaho shows distinct promise.

He and William A. Elsasser, also of the Dental Resources Division, applied the system to approximately 1,000 children who were examined for malocclusion. For purposes of comparison, in connection with the possible role that fluoridated drinking water may play, one of the communities studied has fluorine-containing water while the other has a supply that is virtually fluorine-free. All of the children examined are of white native stock.

Dr. Pelton estimated that it will take from four to six months to analyze the data that were obtained in this effort to achieve a standard which, in its sphere of dentistry, would be comparable to and as useful as the DMF (decayed-missing-filled) yardstick in caries prevention and control. The Idaho study marked the most aggressive step taken to date by USPHS toward a solution of the problem, and is expected to serve as a pilot plan for long range investigations in the future.

DENTAL SCHOOL FINANCES

The same division of USPHS has almost completed work on a special study of the financial conditions of the country's dental schools, a project in which the American Dental Association has lent cooperation. A meeting of the advisory committee on the survey is scheduled to be held in Washington early in December, at which statistical findings will be presented. The final report is to be given at the annual meeting of the Chicago Dental Society in February.

Apropos of dental education financing, a noteworthy development is that the Department of Defense is studying a plan for establishment of medical and dental scholarships. The idea, as originally advanced by the Army Surgeon General's office, was to set up four scholarships—one in each class—in every medical school, primary purpose being to achieve a definite increment in Regular Medical Corps each year (scholars would be obligated to serve on active duty one year for each scholarship year). Tentatively, the annual allocation per student would be $3,000, two-thirds of which would go for subsistence, tuition and other expenses and the remainder would be paid to the school as a subsidy.

Since the plan was approved, in principle, at the recent meeting of the Association of American Medical Colleges, it is now being examined by military authorities with the end in view of applying it to Navy and Air Force, as well as Army, and extending its scope to cover dentistry and possibly other health professions.

NAVY DENTAL CORPS PROMOTION

In mid-November, President Truman approved the report of a selection board that recommended promotion of Captains Alfred Richard Harris and Herman Paul Riebe to the grade of Rear Admiral in the Navy Dental Corps. Serving on the selection board were Rear Admiral Spry O. Claytor and Captains H. R. Delaney and D. W. Ryan, all of the Navy Dental Corps.

At present Dental Officer for the 14th Naval District, Capt. Harris is a native of Pueblo, Colo., and a dental graduate of the University of Nebraska (1923). He entered the Navy in 1924. Capt. Riebe is a native of Wausau, Wis., and is now on duty at the Marine recruit depot at Parris Island, S. C. He was graduated from University of California College of Dentistry in 1925 and entered the Navy in the following year.

UNIVERSAL MILITARY TRAINING

Two separate reports that were made public within a few days of each other several weeks ago merit attention as documentary material on the subject of dental manpower. One is the first report made to Congress by the National Security Training Commission. The other, more restricted in content, is in the nature of a statistical inventory of dental faculties and was presented to the Health Resources Advisory Committee by its member representing dentistry, Leo J. Schoeny of New Orleans.

Highlights of the Commission's 123-page

printed report, with respect to material of particular importance to the health sciences, are the following recommendations: Establishment of physical and mental qualifications for recruitment in the proposed National Security Training Corps; obligation by the military services to provide medical and dental care and hospitalization for the trainee 18-year-olds; premedical and predental students to be required to take their six months of military training before embarking upon professional training; deferment of medical and dental students from fulfillment of their obligation to serve on active duty as reservists until completion of their professional education.

With Veterans Administration presently operating with inadequate numbers of dentists and physicians, the Commission's emphatic recommendation that UMT trainees not receive the same disability benefits as service veterans is worthy of note. More than 20 million veterans are now potential recipients of hospitalization and health services at VA expense. If 800,000 UMT trainees were added each year to that load "the cost would be exorbitant over a period of time even if, as is expected, the number of trainees who suffer disability as a result of injury or sickness should be very small," said the Commission's report.

DENTAL SCHOOL FACULTIES

Dr. Schoeny's report, based on figures compiled by U.S. Public Health Service, limits itself to a statistical picture of dental faculties and makes no recommendations as to ways and means of halting attrition. All 42 of the nation's approved dental schools and colleges are covered in the study.

Seventeen schools have fewer than 50 faculty members and 17 others have more than 50 but less than 100, according to the report. Of the total of 2,907 instructors, 2,465 are dentists (40 of them also hold M.D. degrees) and 151 are physicians. Average age is 40 and one-half of them are 37 or older. The youngest was 20 years old and the oldest 81. The average school was found to have seven students per equivalent full-time faculty member, the ratio ranging from 3 to 17 per instructor.

International Correspondence

NEWS FROM GREAT BRITAIN

The return of the Conservative Party to power has no particular significance for the dental profession at this early stage. The Party has made no declaration of policy on dental matters, although it has frequently expressed concern at the state into which school dentistry has fallen and has declared its desire to see conditions for school dentists improved so that this important public service can be carried out more successfully than it has since 1948. The Labour Party had declared its intention to introduce a new dental act abolishing the Dental Board of the United Kingdom and creating a Dental Council in its place, if it were returned to power, and there is no indication that such an act will be introduced during the present session of Parliament.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

The third report of the Faculty of Dental Surgery, just published, reveals that the demand for postgraduate instruction under the aegis of the Board of the Faculty continues to increase. Two courses organized with the Institute of Dental Surgery of the University of London received special mention, since students from all parts of the world, especially the Commonwealth, attended them, and Sir William Kelsey Fry has attended the college each week to interview postgraduate students and advise them regarding their training. Plans for the future include the establishment of a well equipped department of dental surgery within the college buildings.

The Cartwright Prize, to be awarded in 1956, is offered for the best essay on "The Diagnosis and Treatment of Fibro-Osseous Enlargements of the Jaws," presented by any person engaged in the study or practice of dental surgery and possessing qualifications suitable for registration under the Medical Acts of the United Kingdom. No award was made for the quinquennium 1946-50.

A new award, known as the Colyer Medal, will be awarded for distinguished labours, researches and discoveries eminently conducive to the improvement of natural knowledge concerning dental surgery. The award is named in honor of Sir Frank Colyer, for 50 years curator of the Odontological Museum.

The Commemoration Fund, which now totals £3,400, is to be used for holding lectures, or for other educational or scientific services determined by the Board, in honour of distinguished dental surgeons. The fund commemorates the founding of the Faculty.

The Board of Faculty has accepted in principle the following criteria, suggested by a joint committee of the three Royal Colleges, regarding the training of consultants. (1) Consultants must have received their training by holding posts at an approved hospital. Each College shall approve hospitals for higher training in its own branch of the profession and recognition shall be granted by the standing joint committee on the nomination of the individual College concerned. (2) Consultants shall have a minimum of six years' training and experience after qualification approved by the Royal College and during that time a higher qualification must be obtained. (3) Consultants must hold a higher degree or qualification approved by the Colleges. (4) Consultants must hold or have held a hospital appointment approved by the Colleges.

The Board has presented to the Minister of Health, as an urgent matter, its view that immediate action should be taken to provide adequate dental departments in general hospitals staffed with properly experienced personnel. Such action would provide greater opportunities for newly qualified dentists to gain experience in hospital dentistry, and would also widen the scope for training consultants. The Minister of Health is reported to have received the suggestion sympathetically.

ROYAL COLLEGE OF SURGEONS, EDINBURGH

The first meeting of the fellows was held in early October and the following were elected to a committee to represent Scottish dentistry: F. G. Gibbs, chairman; D. S. Middleton, secretary; J. Aitchison of Glasgow University; A. Cubie of Glasgow; T. H. J. Douglas, senior dental officer of the Department of Health for Scotland; A. D. Hitchin, St. Andrews University; W. Russell Logan, consultant in orthodontics at Edinburgh dental school; Duncan Macgregor, member of the Dental Board of the U.K.; and W. R. Tattersall of Dundee, chairman of the representative board of the British Dental Association.

THE KING'S ILLNESS

The illness of His Majesty the King has been the anxious concern of all in Britain, and a telegram to the Queen from the president of the B.D.A., E. B. Dowsett, was among the many which expressed the hope of a speedy recovery.

Association Affairs

THIS MONTH'S MEETINGS OF ASSOCIATION AGENCIES

Three agencies of the Association have scheduled meetings for December in the Central Office. They are the Council on Legislation, the Special Committee on National Emergency Dental Services, and the Special Committee on Survey of Dentistry of the Board of Trustees.

Legislation • The Council on Legislation will meet December 9-10, according to E. Harold Gale of Albany, N.Y., chairman. The Council will review the status of dental legislation introduced during the first session of the 82nd Congress, study the actions of the House of Delegates of the Association which may affect legislative policy, and make plans for the second session of Congress which begins next month. Prime target for the second session, Dr. Gale reported, will be the enactment of the Army Dental Bill already passed by the Senate.

Emergency Dental Services • The Special Committee on Emergency Dental Services will meet on December 20, according to LeRoy M. Ennis, chairman. The Council will consider the implications of the Universal Military Training program, with special attention to the October report to Congress by the National Security Training Commission. (See Washington News Letter, page 736, for highlights.) It will appoint the membership of a special subcommittee to handle civil defense matters, and it will consider the dental materials situation and the effect on it of priorities and allocations.

Survey of Dentistry • The Committee on Survey of Dentistry, special committee of the Board of Trustees, will meet on December 10. Members are H. B. Washburn of St. Paul, treasurer of the Association; J. B. Carr of Indianapolis, Seventh District trustee; and Harold Hillenbrand, secretary of the Association.

Board of Trustees • Date of the spring meeting of the Board of Trustees has been set for March 27-29, 1952. The meeting will be held in the Central Office.

EARNEST SUCCEEDS ALSTADT ON LEGISLATION COUNCIL

J. C. Earnest of Monroe, La., has been appointed to the Council on Legislation of the Association by LeRoy M. Ennis, president, to fill the unexpired term (1952) of W. R. Alstadt of Little Rock, Ark. Dr. Alstadt is the newly elected trustee from the Twelfth District.

"CAREER IN DENTISTRY" FILM PRESENTED TO ASSOCIATION

The American College of Dentists has presented to the American Dental Association a sound motion picture, in color, entitled "A Career in the Profession of Dentistry." Designed for use by members of the profession who are called upon to speak to high school and junior college students regarding a career in dentistry, the film is intended to provide incentive for highly qualified students to train for the profession, rather than to increase the total number of applicants, according to Willard C. Fleming, president of the College. Dr. Fleming is also dean of the College of Dentistry of California, where the film was produced from

Exhibit booth of the International Dental Congress displayed in the National Guard Armory, Washington, D.C., during the ninety-second annual session of the Association. Cyril de Vere Green of London, England, and Marian D. Luehring of the Central Office, reported their booth was one of the most popular in the Armory. (See story, page 749.)

Inset are representatives of international dentistry, photographed as they spoke before the House of Delegates. Reading counter-clockwise, they are:

Don W. Gullett, Toronto, Canada. "Greetings from the Canadian Dental Association."

Cyril de Vere Green, London, England. "The International Dental Congress needs the support of American dentists."

Josse de Wever, Antwerp, Belgium. "All this leads to international understanding."

Kenneth Adamson, Melbourne, Australia. "In extending dental services we intend to begin with the child."

Carlos J. Cornish, Mexico City, D.F. "Fraternal greetings from Mexico."

Harold W. Oppice, president of the Association, and David T. Fitzgibbon, chairman of local arrangements for the ninety-second annual session in Washington, D.C., at the Tomb of the Unknown Soldier in the Arlington National Cemetery, on October 16. The wreath was placed on the tomb by Dr. Oppice at a ceremony at which he was assisted by members of the Board of Trustees. "It is a shrine built by a million men through two centuries to remind us that freedom is not a gift," said Dr. Oppice.

Right: Harold W. Oppice presents the gavel of office to LeRoy M. Ennis whom he installs as new president of the Association.

Below: Members of the Board of Trustees of the Association, photographed with President Truman in the Rose Garden of the White House, where they were received informally by the President on October 16.

shots taken on other campuses throughout the country.

The 16 mm. film will eventually be available on a rental basis from the Association's film library, now being organized after authorization by the House of Delegates in October. In the meantime, inquiries should be directed to Dr. Fleming, who has announced that copies may be purchased for $150 apiece. His address is College of Dentistry, University of California Medical Center, San Francisco 22.

SHAILER PETERSON MADE HONORARY A.A.D.E. MEMBER

Shailer Peterson, secretary of the Council on Dental Education of the Association, has been elected to honorary membership in the American Association of Dental Examiners. The announcement was made by Carl A. Bumstead of Lincoln, Neb., secretary-treasurer of the A.A.D.E.

ENNIS APPOINTS DELEGATES TO NATIONAL HEALTH COUNCIL

The appointment of the Association's 1952 delegates to the National Health Council has been made by LeRoy M. Ennis, president. They are Daniel F. Lynch of Washington, D.C., and Percy T. Phillips of New York. Dr. Ennis is the third delegate by virtue of his office as president of the Association.

UMW DENTAL PROGRAM SUBJECT OF CHARLESTON MEETING

The dental program operated by the United Mine Workers of America Welfare and Retirement Fund was the subject of a meeting in Charleston, W. Va., on November 26. Called by the Council on Dental Health of the Association, the meeting, attended by representatives of state dental societies in the coal mining areas, was conducted by David W. Brock of St. Louis, chairman of the Council. Allen O. Gruebbel, secretary of the Council, and Bernard J. Conway, assistant secretary of the Council on Legislation also attended.

ASSOCIATION MEMBERSHIP SURPASSES 1950 FIGURE

Membership in the Association reached 76,012 on October 31, just surpassing the figure for a year ago of 76,005.

Meantime, circulation of THE JOURNAL jumped to 78,164, an increase of 2,904 over the June 1951 circulation of 75,260.

NEW CENTRAL OFFICE APPOINTMENTS ANNOUNCED

Three new Central Office appointments have been announced by Harold Hillenbrand, secretary of the Association.

Bernard J. Conway, staff member of the Council on Legislation since December 1949, has been appointed assistant secretary of the Council. Mr. Conway, who has a Bachelor of Laws degree from Loyola University, will continue to give special attention to state legislation.

Claire Danziger has been appointed assistant director of the Bureau of Public Information. Miss Danziger has been on the Bureau's staff since February 1950, when she came to the Central Office with 12 years' newspaper experience during which she was night telegraph editor on the *Chicago Herald American* and assistant foreign editor on the *Chicago Sun*. She has a Bachelor of Arts degree from the University of Chicago. Director of the Bureau is Herbert B. Bain.

Marian Driscoll has been appointed administrative assistant in the Division of Dental Health Education, to succeed Lucia Stolp, who resigned on November 1. Miss Driscoll will perform editorial

duties in the preparation of dental health education material. Formerly sales promotion manager of Potomac Engineering Corporation, Miss Driscoll has a Bachelor of Arts degree in journalism from the College of Mount St. Joseph, Cincinnati. During her career she has also been woman's page editor for the *Logansport Press* (Ind.), training supervisor and author of a manual for Montgomery Ward and Co., assistant editor of *College and University Business*, and editor of a trade journal.

"AMERICA'S DENTAL LEADERS" NOT AN ASSOCIATION PROJECT

The publication entitled "America's Dental Leaders," reported to be in preparation by Distinction Press, Inc., of Chicago, is in no way sponsored by or connected with the American Dental Association. Inquiries have been received at the Central Office from members who have been circularized by the firm with a request for biographical information to include in the volume.

Dental Societies

INDIANAPOLIS DISTRICT PLANS ALL-DAY MEETING IN JANUARY

The Indianapolis District Dental Society has reported it will hold its annual all-day meeting on January 14, 1952, in the Rice Auditorium of the Indiana State Board of Health Building.

Presentations on the importance of roentgenography in treatment planning, the design and construction of removable partial dentures, and acrylic jacket crowns and bridges, by L. B. Spear of Indianapolis, Arthur R. Frechette of Bethesda, Md., and Frank C. Starr of Columbus, Ohio, respectively, will be followed in the afternoon by a program of 9 table clinics by 13 outstanding clinicians. A "telephone course" entitled "Factors Influencing Occlusion" will comprise the evening program, the announcement states.

Details may be obtained by writing to the secretary, D. C. Barnhill, 400 Bankers Trust Building, Indianapolis.

MASSACHUSETTS SOCIETY TO OFFER SEMINARS NEXT MONTH

The Massachusetts Dental Society will conduct its 1952 annual educational course January 29-30, with a program of nine postgraduate teaching seminars in cooperation with the Harvard and Tufts dental schools and the Forsyth Dental Infirmary for Children, a program of table clinics, and an evening seminar on periodontics.

Fourteen clinicians outstanding in their fields complete the two-day program, with sessions on oral surgery, roentgenology, fixed bridgework, pedodontics, partial prosthesis, and other subjects.

Subscription to the course, including a luncheon with a guest speaker, is $7.50. Details may be obtained by writing to L. T. Maloney, 227 Commonwealth Avenue, Boston.

NEW COMPONENT SOCIETY ANNOUNCED IN MICHIGAN

Formation of a new component society, the Kalamazoo Valley District Dental Society, has been approved by the Michigan State Dental Association, according to H. C. Gerber, Jr., executive secretary of the state association.

Officers of the group, which formerly held membership in the Southwestern District Dental Society of the state, are J. R. Short of Kalamazoo, president, and T. W. Howson of the same city, secretary.

National Defense

ADMIRAL PUGH LAUDS KOREAN ROLE OF NAVY DENTAL CORPS

Rear Admiral Lamont Pugh, Navy Surgeon General, paid tribute to the fine performance of members of the Navy's Dental Corps in Korea, when he spoke on October 14 at the annual dinner of the International College of Dentists in Washington, D.C. "I should be derelict indeed if I did not pay pointed tribute to the commendable role members of the Navy's Dental Corps are performing in the current Korean conflict," he said, adding that a high order of performance had come to be expected of them, based on the precedent set in the past by the Corps.

The Admiral stated that 210 Navy dentists have seen service in Korea since the outbreak of hostilities. A total of 84 Navy dental officers and 135 enlisted dental technicians, assigned with them, are now in the Far Eastern theater. Of these, 40 dental officers and 58 enlisted dental technicians are serving with the Marine Corps, and 48 dental officers and 77 enlisted dental technicians are in ships. In addition, 19 dental officers and 32 enlisted dental technicians are on duty in Japan, he reported.

NAVY 1952-53 DENTAL INTERN TRAINING PROGRAM ANNOUNCED

The Navy, continuing its naval dental intern training program during 1952-53, has announced that one-year rotating internships in selected U.S. Naval Hospitals and the U.S. Naval Dental School, National Naval Medical Center, Bethesda, Md., will be available beginning in August 1952. The announcement came from Rear Admiral S. O. Claytor, chief of the Dental Division and assistant chief of the Bureau of Medicine and Surgery, Department of the Navy, who stated that all applications must be in the Bureau of Naval Personnel by March 13, 1952.

Complete information may be obtained from any U.S. Naval Recruiting Station, Office of Naval Officer Procurement, District Dental Officer, or the chief of the Bureau of Medicine and Surgery, Navy Department, Washington 25, D.C.

ARMY TO ACTIVATE 165 DENTAL RESERVE OFFICERS

The Department of the Army has announced that 165 recently commissioned dental Reserve officers will be ordered to active military service in January. Dentists affected are in the Priority I group who accepted commissions after registering with Selective Service under Public Law 779.

Regional quotas, "determined by the Army after consultation with civilian dental and health authorities in order to ensure the continuance of adequate dental care" in the areas, are reported to be as follows: First Army, 40; Second Army, 10; Third Army, 20; Fourth Army, 25; Fifth Army, 40; and Sixth Army, 30.

To date, the Army has ordered 1,076 Priority I dental reservists to active duty, including 78 in November, the announcement stated.

CIVIL DEFENSE INFORMATION KIT IS AVAILABLE

An "information kit," prepared by the Federal Civil Defense Administration, is available for use by personnel of national, state and local organizations in their civil defense efforts.

The material includes a speaker's kit containing speeches for use with various types of audience, as well as booklets describing the principles of civil defense against atomic and biological warfare,

Rear Admiral A. W. Chandler (second from left), dental inspector general in the Navy's Bureau of Medicine and Surgery, photographed on his arrival in Honolulu on August 30, on the first lap of his 37-day around-the-world flight inspection tour of naval dental activities. With him are Lt. Cmdr. Joseph J. Jacobs (right), his administrative executive assistant, and Capt. Clay A. Boland, head of the Reserve Branch in the Dental Division, who accompanied the Admiral as far as the Philippines. Rear Admiral Carl A. Broaddus (left) and Capt. Curtiss Schantz (center), on duty in the Pacific area, greeted the party on their arrival.

the responsibilities of national organizations in civil defense, and the aids obtainable from FCDA by state and local organizations. A comprehensive outline, or "Study Guide" also is included.

The kit may be obtained for $1.50 from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

DENTISTRY JOINS IN MEDICAL CIVIL DEFENSE CONFERENCE

Dentistry was represented among 350 leaders in the health professions and a panel of 14 speakers from the Federal Civil Defense Administration, who participated in a Medical Civil Defense Conference held November 9-10 in Chicago. The meeting, sponsored by the American Medical Association, American Hospital Association, and Association of State and Territorial Health Officers, was held for the purpose of accelerating and unifying medical civil defense planning.

Russell W. Bunting, dental consultant in the health and special weapons defense division of FCDA, pointed out that the country's dentists constitute a vast reservoir of trained men for auxiliary services to supplement the inadequate number of medical personnel available in case of disaster. Their role must be determined by joint action of dental and medical groups at the planning stage at all levels, he said.

Rudolph H. Friedrich, chairman of the Council on Federal Dental Services of the Association, urged that state health directors should assume the responsibility, invested in them by law, for coordinating the health services in planning a civil defense program at the state level and, with local health personnel and associations, at the local level.

Julius J. Stein, chairman of the California Emergency Medical Service Committee, pointed out that in his state dentistry is represented on a citizens medical committee which acts in an advisory capacity to the policy making body. The committee has recommended that eight dentists be provided for every 500 hospital beds, he said.

Francis J. Garvey, secretary, and Bernard J. Conway, assistant secretary of the Council on Legislation of the Association, also attended the conference.

ADVISORY GROUP BOOSTS U.S. DEFENSE BOND CAMPAIGN

A rise in Defense Bond purchases is expected this month as a result of a boost given to the U.S. Treasury Department's campaign by the newly formed National Professional Associations Advisory Committee for Defense Bonds.

The Committee, formed jointly by eight national professional organizations including the Association, the American Medical Association, the American Hospital Association, and other prominent

groups, was set up in October to function in an advisory capacity to the Treasury Department. It will also spur the purchase of defense bonds by self-employed professional men, by putting into their hands a form which they need only fill out and mail in order to instruct their bank to purchase a bond a month, and to make the deduction from their checking account.

National Bond Chairman for the Association is Harold W. Oppice, immediate past president, who has reported that early this month a letter bearing his signature will go to every member of the Association. Enclosed with it will be a form for the recipient's convenience in instructing his bank, as well as descriptions of three types of bonds from which he can choose.

Under the Series E Bond-a-Month Plan, recommended by the Treasury Department, purchase of a bond a month starting now will provide monthly retirement payments beginning 20 years hence, 77 per cent higher than the purchase price of the bonds. Thus, if the investor would like to receive $266.67 a month in 20 years' time, he may instruct his bank to purchase a $150.00 bond each month; if he wishes to receive $133.33 a month in 20 years' time, he may purchase a $75.00 bond each month. Other denominations also are available.

Series G Bonds, designed "for substantial funds," according to the Treasury Department, yield a steady 2½ per cent return which is paid by check semi-annually; they are redeemable at par in case of death. Series F Bonds yield 2.53 per cent interest compounded annually when held to maturity.

Dental Education

DENTAL EDUCATORS TO CONFER IN CHICAGO IN FEBRUARY

Dental textbooks and licensure examinations will be the subjects of two panel discussions to be held at the eighth annual Congress on Dental Education and Licensure, scheduled for February 2, 1952, in Chicago. Sponsored by the Council on Dental Education of the Association, the Congress will be attended by approximately 250 dental educators from most of the nation's dental schools, and dental examiners from most of the states, and is open to anyone interested in problems of dental education or licensure, according to Shailer Peterson, secretary of the Council.

In preparation for the meeting, consultation with dental educators and examiners throughout the country is already in process, and their views will again be sought from the floor of the meeting by the panel members, Dr. Peterson reported.

The planning committee is comprised of Eugene R. Westcott of Atlantic City, N.J., chairman of the Council; J. Roy Blayney of Chicago; Otto W. Brandhorst, Council member and president-elect of the Association; and Arthur W. Easton of Norway, Maine, in addition to Dr. Peterson.

The meetings will be held at the Conrad Hilton (formerly the Stevens) Hotel.

N.Y. ADVISED TO DOUBLE ITS DENTAL EDUCATION FACILITIES

New York State needs twice the accommodation now available for training dental students, if the critical shortage of dentists anticipated by 1958 is to be avoided, according to Walter H. Wright, dean of New York University College of Dentistry.

In his annual report, recently made public, Dean Wright said that increased facilities are needed to accommodate 2,200 dental students and provide approximately 500 graduates a year. He urged the building of a new and enlarged dental school at New York University with a capacity of 800 students, and called for the establishment of two state dental schools and expansion of existing private schools in the state and in New York City.

New York already has 744 dentists less than the number needed to provide one per 1,000 population, and New York students studying dentistry in the U.S. last year totaled 37 per cent less than during 1937-45, he explained. He pointed out that "estimates show the country will require 12,400 additional dentists by 1954, including those who graduate this year," and that of this total New York State must supply 17 per cent, or 2,100. "Add to this our present deficit of 744 and we arrive at a total of 2,800 dentists that the state will need by 1954," he said.

ILLINOIS BEGINS THIRD TELEPHONE COURSE PROGRAM

The University of Illinois dental school started its third series of telephone postgraduate courses on November 12, according to Saul Levy, coordinator of postgraduate studies extension division. The courses will be transmitted on a national telephone hookup to enrolled dental societies.

Again entitled "Current Advances in Dentistry," the 1951-52 series will be comprised of five 1½-hour panel discussions on dental caries, the denture and the temporomandibular joint, factors influencing occlusion, advances in dental radiology, and oral infections, by 30 nationally known lecturers, Dr. Levy announced.

Tuition fee is $10 per person for the series. Further details may be obtained by writing to Dr. Levy, at the University of Illinois College of Dentistry, Postgraduate Studies Extension Division, 808 South Wood Street, Chicago 12.

TUFTS PLANS THIRD ANNUAL BERKSHIRE CONFERENCE, 1952

Plans are already under way at Tufts Dental School, Boston, for the third annual Berkshire Conference in Periodontology and Oral Pathology, to be held at Eastover, a resort hotel in Lenox, Mass., June 15-19, 1952. According to a preliminary announcement from the division of graduate and postgraduate studies of the dental school, which conducts the conferences, the four-day program will be comprised of lectures, seminars and panel discussions on clinical problems, by outstanding teachers and clinicians in dentistry, medicine, and related fields. The faculty of 12 will include Hans Selye, professor and director of the Medical Institute of Experimental Surgery of the University of Montreal, whose name is associated with current knowledge of the general adaptation syndrome; H. B. G. Robinson, professor of oral pathology and oral diagnosis at Ohio State University, who will speak on oral neoplasms; William Dameshek, professor of clinical medicine at Tufts College medical school, whose subject will be clinical hematology; and Irving Glickman, director of the division of graduate and postgraduate studies at Tufts College dental school, whose presentation will be entitled "Present Day Frontiers in the Periodontal Field," as well as other leaders in the health professions.

Tuition is $100; room, board and incidentals total $70 per person. Further details may be obtained by writing to the Berkshire Conference, Tufts College Dental School, 136 Harrison Avenue, Boston 11, Mass.

DENTAL SCHOOLS ANNOUNCE NEW POSTGRADUATE COURSES

University of Illinois • A two-year, full-time postgraduate course in the basic sciences is offered by the department of oral and maxillofacial surgery of the University of Illinois dental school, which states that the course will carry credit toward a Master of Science degree. Applications for September 1952 are now being accepted, it is reported.

Further details may be obtained by writing to the Department of Oral and Maxillofacial Surgery, College of Dentistry, University of Illinois, 808 S. Wood Street, Chicago 12.

Temple University • A postgraduate course in endodontics, under the direction of Morton Amsterdam, and one in periodontics directed by Jacoby T. Rothner, are scheduled to begin in February, it has been announced by Temple University dental school. The endodontics course is to be held on seven successive Wednesdays beginning on February 6, and the periodontics course on seven successive Thursdays beginning on February 7. Fee for each course is $175; attendance is limited to 15.

Application blanks may be obtained by writing to Temple University School of Dentistry, 3223 North Broad Street, Philadelphia 40.

University of Oregon • Six postgraduate courses for the winter term have been announced by the University of Oregon dental school. Subjects, instructors, dates and tuition fees are as follows: oral pathology and diagnosis, by John K. Young, January 14-18, fee $50; partial dentures, by C. N. Skinner, January 21-25, fee $75; dentistry for children, by Hugo M. Kulstad, January 28-29, fee $25; nutrition and endocrine therapy, by J. Donald Shriber, February 4-5, fee $25; oral surgery, by David H. Grimm, February 18-25, fee $75, attendance limited to 10; crown and bridge construction, by John Kuratli, March 10-21, fee $150, attendance limited to 10.

Further details may be obtained by writing to Vinson M. Weber, head of the department of postgraduate education, University of Oregon Dental School, 809 Northeast Sixth Avenue, Portland 14.

New York University • A full-time course in periodontics and oral medicine, beginning in September 1952 and ending in May 1953 and leading to a certificate, has been announced by the New York University dental school. Attendance is limited to four.

Half-time two-year courses also are offered, in addition to a three-week refresher course beginning June 2, 1952, the announcement states. All courses are under the direction of Samuel Charles Miller.

Further details may be obtained by writing to the secretary, Postgraduate Division, New York University College of Dentistry, 209 East 23rd Street, New York 10.

International

DENTISTRY ON PROGRAM OF LATIN AMERICAN CONGRESS

Dentistry will be represented on the scientific program of the fourth Latin American Congress of Physical Medicine, to be held in Panama City February 24-29, 1952, according to an announcement by Cassius Lopez de Victoria, its executive secretary.

The Congress will continue until March 9, with visits to medical institutions and other points of interest in Costa Rica, Honduras, El Salvador, other South American countries, and Mexico.

Further details may be obtained by

writing to Dr. Lopez de Victoria, Latin-American Congress of Physical Medicine, 176 East 71st Street, New York.

400 ENROLL IN INTERNATIONAL DENTAL CONGRESS IN TWO DAYS

In the two days October 15-16, more than 400 dentists stated they planned to attend the International Dental Congress to be held July 19-26, 1952, in London, according to Cyril de Vere Green of the Fédération Dentaire Internationale, which sponsors the Congress. In addition, at least 1,000 dentists from U.S.A. have already made travel arrangements, he estimated.

The figures were revealed after Dr. Green had spent four days at the exhibit booth of the Congress at the National Guard Armory, answering queries and issuing enrollment forms, during the ninety-second annual session of the Association in Washington, D.C. He was aided by Marian Luehring, Association employee in the Central Office. (Picture on page 740.) An employee of the British Dental Association will perform a similar function for the American Dental Association at the Congress, to be held in London July 19-26, 1952, it is reported.

Most important part of the scientific program will be the general discussions of a series of 20 reports constituting a survey of the whole field of dental science, according to the Scientific Committee. Among those presenting the reports are Henry Beyron (Sweden), Malcolm Wallace Carr (U.S.A.), John W. Gilbert (Great Britain), Louis I. Grossman (U.S.A.), A. Lundstrom (Sweden), S. A. MacGregor (Canada), R. Marguerite (France), E. Matthews (Great Britain), Birger Ofstad (Norway), J. M. Spoorenberg (Holland), J. Staz (South Africa), Alfred A. Steiger (Switzerland), Isaac Schour (U.S.A.), Stanley D. Tylman (U.S.A.), and Shailer Peterson (U.S.A.). Dr. Tylman and Dr. Peterson, both of Chicago, are former chairman of the Council on International Relations and secretary of the Council on Dental Education of the Association, respectively.

Enrollment forms may be obtained by writing to H. Parker Buchanan, secretary general, International Dental Congress, 13 Hill Street, London W 1.

E. B. DOWSETT, BRITISH DENTAL ASSOCIATION PRESIDENT, DIES

Word was received at press time that Col. E. B. Dowsett of London, England, president of the British Dental Association, died suddenly on November 13.

C.D.A. PRESIDENT CITES AID OF ASSOCIATION TO CANADA

An example of international cooperation in dentistry is the assistance given to the Canadian Dental Association by the councils of the American Dental Association, especially with regard to raising the standards of dental education, according to Harold M. Cline, president of the C.D.A.

On a good-will visit to the Central Office in Chicago, on his way home to Vancouver after a "visitation trip" to the provinces which took him as far east as Newfoundland, Dr. Cline expressed his "highest appreciation" for the cooperation and assistance given to the C.D.A. by the Association, and also for the "great degree of courtesy" extended to him by the Central Office staff.

"Our dental education council in the C.D.A. is now well established," Dr. Cline reported, "and the survey of dental schools, planned after consultation with the Council on Dental Education of the American Dental Association, has been completed as a preliminary step in an accreditation plan."

The Council on Dental Therapeutics is another agency of the Association upon whose activities the C.D.A. has grown

ASSOCIATION HEADQUARTERS, AND OTHER BACKGROUND ACTIVITIES, AT THE STATLER HOTEL IN WASHINGTON, D. C., DURING THE NINETY-SECOND ANNUAL SESSION

Pictured here are some of the annual session activities which, although sometimes operating 18 or more hours a day, were not visible to many of the dentists in attendance.

At top of opposite page, extreme left, G. B. Denton (center) prepares the proceedings of the meeting from the verbatim typescript fed to him by Janna Q. Olson (right of picture), stenotypist, and her assistant, Mona Clair (left of picture). Dr. Denton is consulting with Doris Nugent, executive assistant in the Office of the Secretary. Checking budget figures (second from right) is Dorothy G. Wright, accountant.

In the second picture is the Association's exhibit booth at the National Guard Armory, manned by Catherine Lipke.

Above, typing and cutting stencils of material which appeared next morning at the place of every member of the House of Delegates, are, standing, Ruth Schoeneman, Alice L. Panresis, Velma M. Child (in charge of the Headquarters Office). Seated are June L. Ewing, Olga Olive Norberg, Margo Davies, Ruth E. Wade, Eleanore B. Dufour (assigned to the Speaker of the House), and M. Patricia Connelly. Not pictured are Marion E. Philips and Lucie Stolp.

Above, right, Frances Collis, supervisor of the Mimeograph Department, runs off the stencils, assisted by Robert A. Spates, Shipping Room supervisor of the Association.

On the opposite page, below, Frances A. Lyon assists Dr. and Mrs. H. W. Silverstein of Atlanta, Ga., as they register at the Armory. Mrs. Lyon is supervisor of the Membership Department.

to depend, Dr. Cline stated, since there is no comparable council in the Canadian organization.

WHO PROJECT FOR EL SALVADOR INCLUDES DENTAL HYGIENE

Dental hygiene is included in plans for a "Health Demonstration Area" soon to be established in El Salvador, South America, under the direction of the World Health Organization. In addition the plans include work in environmental sanitation, maternal and child health, nutrition, control of malaria, tuberculosis, venereal disease and other communicable disease, as well as laboratory services, health education, general medical care, and public health training. The project, which was requested by the El Salvador government, is to serve as a model in the development of other areas in that country, with El Salvador resources, it was announced by the Department of State.

The health demonstration area is to be located in the San Andreas valley, and headquarters is to be in the town of Quezaltepeque. Eleven other towns in the area are offering funds and facilities for clinics and sanitation projects. The El Salvador government is contributing approximately $200,000 for the first year; WHO is to furnish technical experts, equipment and supplies, and to award training fellowships, at an expenditure of approximately $150,000, the report states.

The project is similar to those planned for Turkey, Peru, Colombia, Chile and Venezuela.

Public Health

FLUORIDATION OF WATER NOT "MASS MEDICATION"

It is incorrect to refer to fluoridation as mass medication. The addition of fluorides to water to inhibit the inception of dental caries is no more "mass medication" than is the addition of chlorine to prevent the inception of enteric disease. The statement was made by Bruce D. Forsyth, chief dental officer and Surgeon General of U. S. Public Health Service, in the August issue of the USPHS news letter, *Dental News*.

Explaining that "mass medication" implies the use of drugs to treat or cure a disease, Dr. Forsyth said:

> Since the proper treatment of dental caries requires the removal of all diseased tooth structure, the preparation of a cavity (according to definite rules) and the placement of an inert filling material (which restores the tooth outline, occlusion, and so forth), one cannot use the fluorides for the treatment of dental caries because the fluorides do none of these things. One *can* use fluorides and water fluoridation, however, to prevent the inception of dental caries as one uses chlorination to prevent the inception of enteric disease. The proper use of fluorides, therefore, is a preventive procedure and not mass medication."

SAN FRANCISCO CITIZENS VOTE TO FLUORIDATE CITY WATER

The people of San Francisco have voted by a sizeable majority to fluoridate their communal water supply. A referendum on election day, November 6, resulted in 114,125 votes in favor of the measure and 88,377 against it, according to John G. Rooks, executive secretary of the California State Dental Association.

The referendum answers the charge of those opposed to the measure that "at no time have the people in any manner requested or indicated a desire for fluoridation," Mr. Rooks reported. Charges by the opposition included references to socialized medicine, schemes to poison

the people, twisted statements of fact, and other attempts to "refute the truth as presented by the profession," he said.

New Rochelle is First N.Y. Community to Fluoridate • New Rochelle became the first city in New York State to fluoridate its water supply on a nonexperimental basis when the addition of 18.8 pounds of 98 per cent pure sodium fluoride per million gallons of water was begun on October 8, to produce a fluorine concentration of 1 ppm in the drinking water. The announcement came from Cellock B. Dreizen, dentist in the New Rochelle City Health Department.

The program in New Rochelle was developed following endorsement of the health measure in June 1951 by the State Department of Health, when Chester A. Hicks, the city's public health director, set the machinery in motion to obtain approval of the New Rochelle dental and medical societies and the cooperation of the Public Service Commission, Dr. Dreizen reported. Newburgh, N.Y., has had fluoridated water for several years, in an experimental study on the caries-fluorine relationship which, according to published reports, has resulted in a reduction of 32.5 per cent in the DMF rate of children 6 to 12 years of age after four years of water fluoridation.

A.A.P.H.D. FAVORS FEDERAL GRANTS-IN-AID TO STATES

The American Association of Public Health Dentists is in favor of federal grants-in-aid earmarked for dentistry for the promotion of state dental programs in the United States and territories, with fluoridation to be "the main issue involved." A resolution to this effect was passed during the annual meeting of the A.A.P.H.D. in Washington, D.C., on October 14, according to Carl L. Sebelius, acting secretary-treasurer of the organization.

Another resolution endorsed "the action taken by the House of Delegates of the American Dental Association during the 1950 meeting regarding the administrative position of dental units in health departments and the subsequent and continuing efforts [of the Association] in implementing the intent of that resolution."

The members voted unanimously "to commend the Council on Dental Health . . . for its interest in and the active promotion of controlled fluoridation during the past year," Dr. Sebelius reported.

In another action, the secretary-treasurer was instructed "to commend the Council on Dental Health . . . and the editor of THE JOURNAL on the recent publication entitled 'An Evaluation of the Effect of Dental Foci of Infection on Health,'" which the group felt was "a most worthwhile" project, Dr. Sebelius reported.

A.W.W.A. REAFFIRMS FLUORIDATION POLICY

The American Water Works Association, Inc., expressed itself plainly as "ready and willing to cooperate with dental and medical men who advocate fluoridation," when its board of directors, in May 1951, reaffirmed and clarified its two-year-old policy regarding the fluoridation of water supplies. The report came from Harry E. Jordan of New York, A.W.W.A. secretary, who stated that the organization does not promote fluoridation, but feels that "recommendations concerning the application of the procedure at the local level properly stem from the dental, medical and public health groups."

The May 1951 statement read as follows, Mr. Jordan reported:

> Two years ago (June 1949) in convention in Chicago, the American Water Works Association adopted by resolution this statement of policy with reference to the fluoridation of public water supplies:

> In communities where a strong public demand has been developed and the procedure has the full approval of the local medical and dental societies, the local and state health authorities and others responsible for the communal health,—water departments or companies may properly participate in a program of fluoridation of public water supplies.

The past two years have shown this position to be sound. It is now reaffirmed.

> Recommendations for fluoridation are the prerogatives of the dental, medical and public health groups. When the proper authorities approve the treatment, it then becomes the function of the water works utility and industry to follow through willingly and intelligently where proper controls are assured.

The A.W.W.A. is an organization of engineers, administrators and staff personnel engaged in or interested in the furnishing of public water supply, Mr. Jordan reported, and not of professional men in the fields of dentistry and medicine.

AAAS TO PUBLISH MONOGRAPH ON FLUORIDES AFTER MEETING

The American Association for the Advancement of Science will publish in monograph form the symposium on fluorides which will occupy one-third of the time devoted to the dental section of the AAAS at its annual meeting this year. Russell W. Bunting, secretary of the dental section, who released the information, reported that the fluoride session will include a résumé of the dental benefits of fluorine ingestion, by Z. M. Stadt; a discussion of the metabolism of inorganic fluorides, by E. J. Largent; a presentation on acute fluoride poisoning and crippling chronic fluorosis, by G. J. Cox; and a description of the hazards of water-borne fluorides at levels up to 5 ppm, by H. O. Hodge and F. A. Smith. General discussion following the session will be conducted by R. S. Harris.

Studies relating to radioactive isotopes in dentistry, electron microscopy of dental tissues, and presentations relating to the development, structure and function of the tooth components are among the subjects on the remainder of the program, which will occupy three half days.

The meetings will be held in Philadelphia, December 28-29, with headquarters in Convention Hall.

Headquarters of the AAAS is 1515 Massachusetts Avenue, N.W., Washington 5, D.C.

AVERAGE LIFE EXPECTANCY REACHES 68, A RECORD HIGH

The average length of life in the United States has increased to a record high of nearly 68 years, Federal Security Administrator Oscar R. Ewing announced recently. The new figure is based on final 1949 vital statistics compiled by U.S. Public Health Service, and shows a gain of almost half a year over the average lifetime indicated by 1948 death rates, he said.

Mr. Ewing attributed the 20-year increase in life expectancy at birth since the turn of the century "largely to the control of infectious diseases."

General

GIES RECEIVES PENNSYLVANIA AMBASSADORSHIP AWARD

William J. Gies of New York received the fourth Pennsylvania Ambassadorship Award on October 18 from the Pennsylvania State Chamber of Commerce. The presentation was made in Manheim, Pa., where he lived as a child, during the week known in the Commonwealth as "Pennsylvania Week." Manheim observed "William Gies Day" with a program in which 21 local professional and civic groups participated, and with a testimonial banquet at which the presentation was made by Paul E. Bomberger

of Lancaster, Pa., president of the Pennsylvania State Dental Society.

The award, consisting of a plaque and a scroll signed by the Governor of the state and the Secretary of Commerce, the president of the State Chamber of Commerce and the president of the sponsoring organization, is presented annually to a native Pennsylvanian who achieved prominence of outstanding recognition after moving outside the commonwealth. The recipient of the award is chosen annually by 20 professional, commercial and civic leaders in the state, from approximately 90 nominees whose names are submitted by community organizations.

U. OF PENNSYLVANIA DENTAL ALUMNI TO MEET IN FEBRUARY

The Dental Alumni Society of the University of Pennsylvania will hold its midwinter meeting on February 22, 1952, and its annual meeting June 19-21, according to John P. Looby of Philadelphia, chairman of the publicity committee.

W. K. KELLOGG, BATTLE CREEK PHILANTHROPIST, DIES AT 91

Will Keith Kellogg of Battle Creek, Mich., founder of the W. K. Kellogg Foundation Institute, died on October 6 at the age of 91.

Mr. Kellogg founded the Institute in 1930, donating most of his fortune to it including 52 per cent of the common stock of the W. K. Kellogg Company, producer of breakfast foods. The Institute is dedicated to the promotion of the health, happiness and well-being of mankind, especially children, and is principally concerned with health and educational problems in rural areas. It has made many contributions toward the advancement of dental health in this and other countries, both in scientific research and in grants for dental research and dental education.

THREE AWARDS OFFERED BY NEW ARCHIVES OF ORTHODONTICS

The new *Archives of Orthodontics*, which made its appearance last month, is offering three awards "to encourage research and investigation in the sciences, in experimental orthodontics, and in clinical procedures." An announcement of the newly reorganized publication stated that (1) a $200 award is offered for an essay concerning orthodontic research or investigation, (2) a $200 award is offered for a manuscript by a student or students doing research under university or college supervision, and that (3) limited funds are available to defray authors' expenses in the preparation of a manuscript for publication. Manuscripts are to be written in English or be accompanied by an English translation.

Previously published in Belgium, the *Archives* have been expanded in scope and function and are now being published in U.S.A., the announcement stated. Chief editor is Lucien DeCoster of Brussels, Belgium. The editorial board is composed of orthodontic specialists from 23 countries, including J. Stolzenberg and Joseph K. Tucker of Brooklyn, and Benjamin Weiss of Newark, N. J.

Subscriptions, at $12 for a year's volume of six issues, should be sent to the *Archives of Orthodontics*, 115 West Seventh Street, Plainfield, N. J.

DELTA SIGMA DELTA INSTALLS NEW OFFICERS

Delta Sigma Delta dental fraternity held its sixty-seventh annual meeting October 12-15 in Washington, D.C., and installed Myron Lusk of Minneapolis as supreme grand master to succeed William C. Stillson of Cleveland. Archibald Lawson of Pittsburgh was elected worthy grand master. Other new officers are Chester Perry of Detroit, president of the council of deputies; Percy Herrick of Iowa City, Ia., vice-president of the

council, and Edward Mimmack of Buffalo, supreme treasurer.

Stephen G. Applegate of Detroit, Mich., and James V. Gentilly of Cleveland were reelected supreme scribe and supreme historian, respectively.

ORTHODONTISTS ASK RESEARCH REPORTS FOR APRIL MEETING

The American Association of Orthodontists has invited research reports from investigators wishing to report on current research problems at the research section of the April 1952 meeting of the group in Chicago. Presentation time will be limited to ten minutes, according to J. A. Salzmann of New York, chairman, who made the announcement.

Applications are to be sent to John R. Thompson, 311 East Chicago Avenue, Chicago 11, not later than March 15. Each application is to be accompanied by an abstract of not more than 300 words, together with the author's name and address and the name of the institution with which he is associated, if any.

ORAL PATHOLOGY ACADEMY TO MEET IN CHICAGO IN FEBRUARY

The American Academy of Oral Pathology will hold its annual meeting on February 3, 1952, in Chicago, at the Stevens Hotel, and has invited attendance by all interested dentists.

The program will include the following subjects and clinicians, according to a preliminary announcement: histopathology of various gingival enlargements, by Sigmund Ramfjord of the University of Michigan; dental anomalies, by Myron Aisenberg of the University of Baltimore; dermatological diseases affecting the oral cavity, by Lester Cahn of Columbia University; physiology of bone, by Lent Johnson of the Armed Forces Institute of Pathology; bone behavior in periodontal disease, by Joseph P. Weinman of the University of Illinois; oral carcinoma, by Joseph L. Bernier of the Armed Forces Institute of Pathology.

Further details may be obtained by writing to Col. Joseph L. Bernier, secretary, American Academy of Oral Pathology, Registry of Dental and Oral Pathology, Army Medical Museum, Washington, D.C.

ORAL PATHOLOGY INSTITUTE OF N.Y. HOLDS 150th CONFERENCE

Record attendance of dentists and physicians is reported at the one-hundred-and-fiftieth conference of the New York Institute of Clinical Oral Pathology, held on October 29 in New York, at which Hans Selye of Montreal, guest speaker, described the general adaptation syndrome and the actions of ACTH, cortisone and STH. Dr. Selye is professor and director of the Institute of Experimental Medicine and Surgery, University of Montreal.

Others on the scientific program were Percy T. Phillips of New York, member of the council of the Institute; Iago Galdston, executive secretary of the committee on medical information of the New York Academy of Medicine; Nolan D. C. Lewis, director of the New York State Psychiatric Institute; Ephraim Shorr, attending physician at the New York Hospital; and Lester R. Cahn, associate professor of oral pathology at Columbia University.

SOUTHERN ACADEMY OF ORAL SURGERY TO MEET IN MARCH

The Southern Academy of Oral Surgery will hold its second annual meeting and clinic March 22-23, 1952, in Atlanta, Ga.

Details may be obtained by writing to the secretary-treasurer, Robert F. Sullivan, 118 East Jones Street, Savannah, Ga.

Book Reviews

CANCER SERVICES AND FACILITIES IN THE UNITED STATES

U. S. Public Health Services Publication No. 14. 152 pages. Price $0.35. Washington, D. C., Government Printing Office, 1950.

This report gives in one volume, basic information on cancer control facilities and services in the United States. The first section of the report is devoted to the latest data on cancer mortality in the United States by site, on cancer legislation and the sources of public funds available for cancer control programs.

The major part of the text is given over to cancer data and facilities available in each state. This includes the state agency administering the official program, cancer statistics, legislation, funds available and special cancer services available to the public. Information on the location and scope of cancer detection centers, tissue diagnostic services, cytology test services, hospital facilities and home nursing care for cancer patients is included.

This report contains information of value to the dentist as well as to the physician. The statistical report gives the latest available data for each state on deaths caused by cancer of the buccal cavity. The state summaries will assist the dentist in referring patients with precancerous or cancer lesions to the proper establishment in his area for diagnosis and treatment.

Frank C. Cady

CANCER: A MANUAL FOR PRACTITIONERS

By Committee on Publication, E. M. Daland, chairman. Second edition. 308 pages. Boston, American Cancer Society (Massachusetts Div., Inc.), 1950.

The second edition of this cancer manual for practitioners effectively serves its purpose. It not only presents useful information on specific types of tumors by site but it also reviews the general trend in some of the phases of cancer research and treatment. Included are chapters on historical trends in the study of cancer, modern cancer research, epidemiological aspects of cancer, the pathology of malignant disease, the biopsy in relation to tumor diagnosis, symptoms, examination and principles of treatment, and treatment of malignant disease by irradiation. Following this basic discussion of cancer, cancer of various anatomic locations, including the lip, mouth, maxilloethmoidal region and salivary glands, is discussed. The chapters are written authoritatively by specialists in the particular fields.

The discussion of cancer of the lip by Grantley W. Taylor, effectively highlights the problem. The statement is made that the low incidence of cancer of the upper lip may be partly due to a lessened likelihood of trauma from carious teeth. A dentist might find this questionable. In explaining treatment of cancer of the lip, the role of the dentist in cleaning up the mouth is adequately discussed.

Charles C. Lund has written the chapter on cancer of the mouth. This chapter covers cancer of the lining tissues of the mouth in excellent fashion. The only material that might be questioned is the emphasis which Dr. Lund places on high protein diet and the use of gonadotrophic hormones in the treatment of leukoplakia. However, although Dr. Lund has been an advocate of this particular method of treatment for some years, he emphasizes the more usual treatment; that is, removal of all sources of irritation.

Gerald G. Garcelon, in his chapter on tumors of the salivary glands, does not place adequate emphasis on the occurrence of these tumors in the small collection of salivary glands contained within the lips, palate, and other regions outside of the major salivary glands of the mouth.

David Weisberger has written the chapter on the role of the dentist in cancer control. He brings out most of the important preventive roles of the dentist. However, Dr. Weisberger casts some doubt on whether the dentist should perform a biopsy. He emphasizes that unless the dentist has had sufficient training to take tissues for pathological examination, it is advisable to direct the patient to the proper consultant. However, every dentist should be given sufficient training in taking tissue for pathological examination if cancer is to be controlled in dental patients. Dr. Weisberger suggests that all teeth which will be in the path of irradiation should be extracted. This approach to the problem of teeth in irradiation is not realistic for it is not the direct effect of the rays on the teeth but rather their effect on the salivary glands which is important. For that reason the

recommendation of Dr. Lund in his chapter on cancer of the mouth is more useful. Dr. Lund comments that if radiation is to be employed, all diseased teeth, and preferably all teeth, should be extracted before treatment, for the bone is devitalized by irradiation and osteomyelitis or necrosis of the jaw may follow insignificant infection. The very high caries activity in irradiated mouths emphasizes this need.

Some tumors of dental origin have been overlooked apparently because no dentist or oral surgeon who was interested in them participated in preparation of the volume. Ameloblastomas, other odontogenic tumors, and, in general, tumors of the jaw bones have been omitted from discussion. It is realized that this is a manual, not a text, but such lesions are relatively common and important.

The dentist should have a knowledge of recent advances in cancer research and treatment and in the philosophical approach toward the cancer problem. He also should have specific knowledge of cancer within the region that he treats and have available information on cancer elsewhere in the body. This volume appears to fill these needs adequately and serves as a manual for practitioners in dentistry as well as in medicine. An index would add to its usefulness.

H. B. G. Robinson

CLINICAL LABORATORY METHODS

By W. E. Bray, M.D. Fourth edition. 614 pages with 119 illustrations, 18 in color. Index. Price $7.25. St. Louis, C. V. Mosby Co., 1951.

For some years Dr. Bray has been teaching clinical diagnosis to medical students and has been supervising clinical laboratory technicians. He, therefore, has been in a position to select and arrange material, with emphasis on methodology, which would aid the physician in solving clinical problems, using selected laboratory procedures.

The present edition is evidence of the usefulness that *Clinical Laboratory Methods* has achieved. The new edition discusses Watson's method for determining urobilinogen in the urine and feces, hormone assay, sodium bisulfite method for sickling of red cells, results of heparin and dicumarol studies, the diagnosis of hemoglobinuria, and the Coomb's test, as well as the new nomenclature of blood cells. The author includes on a separate page the nomenclature adopted by the committee on hematology of the American Society of Clinical Pathologists and affiliated organizations, but the new terminology does not appear in all of the sections on hematology. In fact, there is still the old spelling, *eosinophile* and *leucocyte*, instead of *eosinophil* and *leukocyte*.

References to the sources from which the material is obtained are an added feature. There are some references which appear at the end of the chapter, others appear at the end of a discussion of the subject, and still other references are placed within the paragraph; thus the reader must be alert to determine the location of the references. There are 17 chapters dealing with various methods used in the clinical laboratory with a comment on the significance of the findings related to disease processes. The author has selected methods which he has found useful in the clinical laboratory. He further emphasizes that the object of this synopsis is to bring together in a small volume for ready reference the more recent information and the most frequently used methods of laboratory diagnosis. This new edition should be of valuable assistance to the technologist in the clinical laboratory as well as to the practicing physician.

S. A. Levinson

TOMORROW'S HORIZON IN PUBLIC HEALTH

Transactions of the 1950 conference of the Public Health Association of New York City. 109 pages with 11 charts. Price $1. Jamaica, N.Y., Public Health Association of New York City, 1950.

This is a compilation of selected papers presented before the New York Public Health Association in January 1950. The contributions are: "The Future of the Voluntary Health Organization," by Iago Galdston, M.D.; "The Newer Epidemiology," by John E. Gordon, M.D.; "Nutrition in the Light of the New Epidemiology," by H. D. Kruse, M.D.; "Tuberculosis in the Light of the New Epidemiology," by James E. Perkins, M.D.; "Permutations in Psychiatry and Public Health," by Robert H. Felix, M.D.; "Public Health and the School," by Ernest G. Osborne, Ph.D.; "The Responsibility of the State," by Wilson G. Smillie, M.D. and "Public Health and the Public," by Eli Ginzberg, Ph.D.

The papers are short, concise, and exceptionally delightful reading. They are well tied together and informative. While by no means to be considered as a textbook, this little publication brings to the public health worker a refreshing, modern viewpoint on the subject of public health as expressed by outstanding authorities in that field.

H. Shirley Dwyer

Current Literature

JOURNAL OF ORAL SURGERY
July 1951

THE NASOMAXILLARY EPITHELIAL INLAY FOR DISH FACE DEFORMITY

John Marquis Converse and Frank E. Jeffreys, p. 183.

Malunited comminuted fractures of the maxilla, particularly of the portion surrounding the pyriform aperture, of the bones and cartilages of the nose and loss of the superior alveolar process may result in a deformity consisting of a retrusion of the whole nasomaxillary region. Marked retrusion of the middle portion of the face, or dish face deformity, is seen in syphilitics. Aside from the deformity, destruction of the septum and turbinates and scarring of the nasal lining result in atrophic rhinitis with its attendant nasal discharge, crusting and foul odor.

The essential anatomic characteristic in many of these deformities is loss of the lining of the nasal cavity. When extreme nasomaxillary retrusion is present and when loss of the upper teeth requires the wearing of a denture, it is feasible to extend the denture upward into the nasomaxillary region. This nasomaxillary prosthesis, an upward extension of the denture, fits into a skin grafted cavity and restores the contour of the soft tissues of the face.

The technic used in these cases is an application of the one developed by Gillies (1923) and McIndoe (1937).

CYSTS OF THE JAWS

Irving Salman, p. 188.

Cysts of the jaws fall into two main categories, odontogenic and nonodontogenic. Cysts may occur as a familial disease. The odontogenic cysts are subdivided into radicular, or dental root, cysts and dentigerous, or follicular, cysts. The radicular or dental root cyst, is due to infection from a tooth or teeth. It originates from the epithelial rests of Malassez (Hertwig's sheath). The radicular cyst will reveal a well defined radiolucent area roentgenographically, with a white line about its periphery, involving one or more teeth and extending to various sizes. The treatment is either removal of the teeth involved and enucleation of the cyst or the conservative surgical approach, which is apicoectomy and enucleation of the cyst.

Dentigerous, or follicular, cysts are epithelial lined sacs found about the crowns of unerupted teeth. They derive their epithelium from the follicle of the developing tooth or teeth. The roentogenographic picture will reveal a well defined, radiolucent area, with a white line about its periphery, and the presence of an unerupted tooth or teeth. Dentigerous cysts may be ameloblastomas. The treatment is chiefly the removal of the unerupted tooth or teeth and enucleation of the cystic membrane.

Nonodontogenic cysts are hemorrhagic or traumatic cysts, median palatine cysts and globulomaxillary cysts. Hemorrhagic, traumatic or extravasation cysts are generally found in young people, and are caused by trauma. The injury produces hemorrhage in the bone, resulting in dissolution of cancellous bone. Roentgenograms reveal a rather well defined radiolucent area which may be irregular in outline. It has no white line about its periphery. The treatment consists of opening a window below the apexes of the teeth and aspirating the contents of the cyst. The median palatine cyst is formed from entrapped epithelium at the junction of the embyronic processes which make up the hard palate. As they develop in size they appear spherical and well defined roentgenographically. Clinically there may be bulging of the anterior part of the palate. Treatment is enucleation of the cyst by a palatal approach, avoiding injury to the teeth.

THE STATUS OF GENERAL ANESTHESIA IN DENTAL PRACTICE

Sterling V. Mead, p. 207.

There is an urgent demand that the dental profession become aware of what is happening in the field of general anesthesia, so that adequate courses of instruction in the dental schools can be provided. Some authorities, in their sincere effort to teach caution about the use of general anesthetics, overstress many things that tend to frighten dentists and discourage the use of general anesthesia in dental offices. It is no longer good practice to limit one's anesthetic practice to one or even two anesthetic agents. There is no ideal anesthetic agent. Each patient should receive in-

dividual study, and the anesthetic agents that best suit his individual needs should be used. Thiopental sodium has become an important adjunct to anesthesia for dental and oral surgical operations. Many dentists become familiar only with local anesthesia because they are not properly taught the use of general anesthesia. Every anesthetic agent is a lethal drug and must be employed with great care by those who have had ample training. All physicians and dentists are permitted to give the various types of general anesthesia; however, the degree of Doctor of Medicine or Doctor of Dentistry does not in reality qualify one to give general anesthetics. Qualification is obtained only by special courses (usually outside the medical and dental schools) and practical training in all of the phases of anesthesiology. It would be impossible to obtain in all dental cases the fee necessary to support a Board member anesthesiologist. Nurse anesthetists administer a large percentage of the general anesthetics given in the United States. Anesthesia is a step-child of both medicine and dentistry. A physician, a dentist, or a nurse, does not learn anesthesia in a school, but in the clinical field. Facilities for research in general anesthesia, as well as local anesthesia, should be provided in the dental school. Some plan of undergraduate study followed by graduate courses should be available to preserve the field of usefulness for dentistry. Unless the dental colleges and profession wake up from this lethargic state, some day dentists will be deprived of the privilege of administering a general anesthetic, and will have to resort to a medical anesthesiologist when it becomes necessary to employ a general anesthetic in the office.

MENISCECTOMY IN THE TREATMENT OF LESIONS OF THE TEMPOROMANDIBULAR JOINT

Reed O. Dingman and Wilbur C. Moorman, p. 214.

Most of the acute inflammatory and traumatic conditions of the temporomandibular joint will respond to conservative management, which includes rest, occlusal adjustments and limitation of motion.

The operation of meniscectomy is indicated in those long-standing chronic progressive conditions in which there is a change in the meniscus of the joint. Whenever possible this operation should be done under local anesthesia. The incision is started in the fold at the anterior margin of the helix at its upper attachment. It is carried downward in this fold to the upper portion of the tragus, where it is continued just inside the margin of the tragus to the anterior fold of the lobule. At this point it again becomes visible and is carried down to the lower attachment of the lobule. The upper part of the incision can be made safely with regard to the seventh nerve. The lower part of the incision must be made with care because of the close proximity to the main branches of the seventh nerve. The joint is easily located by having the patient move the jaw. An incision is made through the fascia, starting at the upper border of the zygoma above the anterior portion of the joint backward and downward paralleling the condyle head to the neck of the condyle. The joint is readily entered by means of a transverse incision paralleling the border of the meniscus into the upper compartment of the joint, and another into the lower compartment of the joint. The edge of the articular disk is grasped with a hemostat. The anterior attachment and the posterior attachment of the meniscus are readily severed by means of small curved, sharp scissors, one blade being placed in the upper joint cavity and one in the lower joint cavity. The medial aspect of the meniscus is cut from its attachment by the use of a small angulated end cutting knife. The joint cavity is carefully inspected for remnants of the disk and for irregularities of the articular surfaces and if negative, the capsule is carefully closed. No attempt is made to limit motion of the mandible. Patients can usually masticate comfortably three or four days after operation. In view of the excellent results obtained in 11 of the 12 cases in which the meniscus was excised from the temporomandibular joint, meniscectomy has a definite place in the treatment of certain types of temporomandibular joint conditions.

MYASTHENIA GRAVIS

Charles W. Keeling, p. 224.

Myasthenia gravis is a comparatively rare disease of unknown etiology, which involves the striated muscles of the body. The muscles of mastication are among the first to be involved and are constantly affected to a greater or lesser degree. The muscles for deglutition and speech are often affected. Among the chief complaints are "dropping of the jaw" and inability to chew and swallow. Patients afflicted with the disease are usually at their best early in the morning and gradually become worse during the day. Stevenson found no atrophy or degeneration of the muscles. A small round cell infiltration was the only finding. Neither was there any constant lesion in the nervous system. Neostigmine seems to

be the drug of choice and gives the best results. It is given either orally or hypodermically at regular intervals during the day in an amount sufficient to control the disease. A positive therapeutic test with the use of neostigmine is considered diagnostic for the disease. The treatment of myasthenia gravis at the present time is symptomatic and not specific. The dosage of the drug and interval given may vary considerably with different patients. The prognosis is grave and doubtful even in those cases responding favorably to treatment.

A TECHNIC FOR OPEN REDUCTION OF FRACTURES OF THE MANDIBULAR CONDYLE

Fred A. Henny, p. 233.

Fracture of the condyle with displacement, accompanied by complete edentia, partial edentia, or massive trauma to the teeth, providing an inadequate means of immobilization, would forecast relatively poor results. The line of surgical approach for open reduction has universally been a preauricular one. This method of reduction has been discontinued because of resultant complications which are lack of adequate access inferiorly, the medial aspect of the condylar head is not available and repeated damage to one of the ramifications of the facial nerve.

An approach was made through an incision at the angle of the mandible because there would be less possibility of damage to the seventh nerve and also less chance of damage to the meniscus. As the fracture line was approached it became obvious that relaxation was inadequate, and 60 units of curare were administered intravenously. This induced complete muscle relaxation and allowed free access to the condylar neck. Detaching the insertion of the external pterygoid muscle where it attaches to the interarticular fibrocartilage and the neck of the condyloid process eliminates the postoperative muscle traction on the condylar head, thereby eliminating the possibility of postoperative displacement of the condyle. This technic has been used in 24 fractures of the mandibular condyle, which include both medial and lateral dislocations of the condylar head. In no case has there been seventh nerve damage of any degree.

USE OF CHLOROPHYLL OINTMENT IN IMPACTED THIRD MOLAR WOUNDS

Joseph C. Tam and Henry B. Clark, Jr., p. 237.

A clinical trial was made using an ointment containing chlorophyll in lower third molar impaction wounds with the hope of achieving primary healing. Wounds resulting from removal of 24 completely unerupted lower third molars were filled with Chloresium Dental Ointment and sutured. Eight sockets (33.33 per cent) resulted in painful osteitis or suppuration representing failure to secure healing by primary organization of the blood clot. Chloresium Dental Ointment would appear unsuitable for use in lower third molar impaction wounds when primary healing is desired.

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A STUDY OF THE EXFOLIATIVE CYTOLOGY IN PATIENTS WITH CARCINOMA OF THE ORAL MUCOSA

Paul W. Montgomery and E. von Hamm, p. 308.

A SURVEY OF THE CHEWING ABILITY OF DENTURE WEARERS

R. S. Manley and Paul Vinton, p. 314.

A survey of masticatory function has been conducted of 100 patients wearing dentures in an effort to disclose which factors are the most important for determining a patient's ability in mastication. The measurements included the maximum biting force, food platform area, and masticatory performance. Peanuts and coconut were the test foods. The patient was asked to name his food preference and those giving special difficulty in mastication. The statements were combined in a single score and designated as tough food tolerance. The average force and performance for denture wearers was much lower than for patients with natural dentition, and it varied widely from person to person.

The most important influence was the rating of clinical excellence of the denture. It was correlated moderately with the maximum biting force, the masticatory performance with peanuts, and the tough food tolerance. The age of the patient had a slight influence, the younger persons tending to have better performance and biting strength than older persons. The masticatory performance with peanuts was the best measure of a subject's tough food tolerance but was not well enough correlated to have much predictive value. When comparisons were made only on those dentures rated as clinically adequate, no correlation

could be demonstrated between any of the factors studied.

SOME CHANGES IN THE CONNECTIVE TISSUE GROUND SUBSTANCE ASSOCIATED WITH THE ERUPTION OF THE TEETH

Milton B. Engel, p. 322.

The changes in the connective tissue ground substance surrounding growing erupting teeth were studied. Fixation was done by the freezing-drying method and carbohydrate complexes were visualized with the periodic acid-leucofuchsin method. In some forms, such as the fetal pig and calf and in the young rat, large quantities of hyaluronic acid appear to be present. This was confirmed by viscosimetry with hyaluronidase. As the teeth approach the surface of the oral mucous membrane the ground substance is altered. It is thought to become depolymerized as deduced by its ability to bind vitally injected Evans blue, its staining reaction with the periodic acid-leucofuchsin procedure and its increased content of water-soluble, alcohol-insoluble carbohydrate.

THE TOPOGRAPHY AND ROLE OF THE GINGIVAL FIBERS

Henry M. Goldman, p. 331.

The purpose of this investigation was to study the arrangement of those connective tissue fibers of the attachment apparatus which are connected to the root of the tooth occlusally to the alveolar crest and to suggest their role in the dental attachment apparatus in health. Beginning subjacent to the epithelial attachment in the buccolingual aspect, three groups of fibers are seen passing out at right angles of the surface of the tooth. The more occlusally placed group bend occlusally, passing into the gingiva and terminating in the papillary layer of the gingival epithelium. The group just below run across the gingiva at right angles to the tooth and become incorporated in the papillary region of the gingiva. A little further apically, the fibers arise from the cementum, pass at right angles to the tooth directly over the alveolar crest and then incline apically between the outer periosteum of the alveolar process and the epithelial covering of the attached gingiva. On the proximal sides, the connective tissue fibers arise from the cementum at the same level as those on the buccal and lingual aspects. The groups subjacent to the epithelial attachment pass occlusally traveling parallel to the crevicular epithelium. The next adjacent group of fibers also passes occlusally and seemingly makes up the framework of the interproximal gingiva. Directly subjacent to these the transeptal fibers are seen.

The function of the gingival fibers is to support the gingiva, keeping it closely adapted to the tooth surface, thus sustaining the gingiva against forces placed on it during mastication. These fibers may also help in the dissipation of forces placed on the tooth during function.

CHANGES IN THE MANDIBULAR JOINT AND PERIODONTIUM OF VITAMIN B COMPLEX DEFICIENT RATS AND THE COURSE OF REPAIR

Robert J. Gorlin and Barnet M. Levy, p. 337.

The changes in the mandibular joint and periodontium of vitamin B complex deficient rats and the course of repair in these structures was studied. Rats with a B complex deficiency show a diminution and cessation of chondrogenesis and osteogenesis in the mandibular condyle and the periodontium. When these animals are re-fed a stock diet, there is a rapid resumption of chondrogenesis and osteogenesis, a remodeling of bone, a hyperplasia of fibrous connective tissue and a repair of the cementum and dentin which had been resorbed while the animals were on the deficient diet.

A REPRODUCIBLE METHOD FOR CARIES EVALUATION

O. Backer Dirks, J. Van Amerongen and K. C. Winkler, p. 346.

The necessity of reproducible methods in scientific caries research, especially for the diagnosis of caries incipiens, is stressed. With clinical methods it appeared impossible to arrive at results with low standard errors.

A roentgenologic method for scientific caries surveys in groups of patients was developed, with which a reliable evaluation of proximal enamel caries of molars and bicuspids is possible. An apparatus to obtain reproducible bitewing roentgenograms is described. It consists of a solid metal ring ground to fit the cone of the x-ray tube and carrying on a rigid wire a perforated metal plate which acts as bitewing. By a set of knobs an exact position of the film in the mouth is ascertained.

The roentgenograms were studied by two dentists and the results recorded separately on charts. The differences were checked afterwards jointly. Methods for charting and the calculation of results are described. In a duplicate set of roentgenograms of 266 children,

the films gave reproducible results with regard to projection and overlapping in 96 out of 100 cases. The number of carious proximal surfaces could be determined with a standard error σ_m = 1 to 2 per cent for each type of surface separately. For all surfaces taken together σ_m was only 0.3 per cent.

THE EFFECT OF THE TOPICAL APPLICATION OF SODIUM FLUORIDE ON THE CALCIUM FLUORIDE CONTENT OF VITAL TEETH

A. B. Hord and R. G. Ellis, p. 360.

ALKALINE AND ACIDULATED FLUORINE SOLUTIONS FOR REDUCING DECALCIFICATION OF ENAMEL

Hubert B. Palmer, Susie Overstreet and Marilyn Sacks, p. 363.

Enamel-dentin fragments, representing non-carious molar teeth extracted from 52 adults, were divided into nine groups. The fragments were treated with various testing solutions and maintained in glucose-serum broth seeded with culture of *Lactobacillus acidophilus* at 37°C. for 30 days. The application of acidulated fluoride solutions to enamel-dentin fragments was shown to be much more effective for reducing decalcification of enamel than the alkaline 4 per cent sodium fluoride solution. It appears evident that a chemical arrangement of the apatite lattice of enamel may be achieved which will result in an enamel tissue that is highly resistant to decalcification.

THE CONNECTIONS BETWEEN DENTAL CARIES EXPERIENCE AND WATER-BORNE FLUORIDES IN A POPULATION WITH LOW CARIES INCIDENCE

Peter Adler, p. 368.

A report is given on field studies which were conducted in seven communities in Hungary on the school population. There were protective fluoride levels in the domestic waters of four of the communities, none in three. The DMF rate in the 12 to 14 year old children was considerably lower in the fluoride areas than in the fluoride-free regions. The percentage difference is approximately equal to that found by Dean and his co-workers in the United States. In spite of the less effective influences promoting caries at work in Hungary, the same fluoride level in that country as that in the United States is required to cause optimal protection. However, lower levels cause some, though less, protection. A comparison of the caries incidence in first molars in 9 to 11 and 12 to 14 year old children of fluoride and fluoride-free areas, and of the caries experience in the deciduous molars of 8 to 9 year old children in these regions, shows that a real protection against caries exists in the fluoride areas, and not a delay of onset only. However, in children who had moved into the fluoride region before their sixth birthday, there was hardly any difference at 12 to 14 years of age in the caries experience in the permanent dentition as compared to that of the children born and reared in the fluoride communities. In some communities, forces are at work promoting the onset of caries, resulting in increased caries incidence. The term "eufluorosis" is coined, to express optimal protection, maximal saturation of the teeth by fluoride *in vivo*, without disfiguring mottling. As complementary terms, hypofluorosis and hyperfluorosis may be used.

THE RELATIVE INCIDENCE OF CARIES IN UPPER AND LOWER MOLAR TEETH OF ALBINO RATS (RATTUS NORVEGICUS)

R. F. Keller, Jr., H. R. Hunt and C. A. Hoppert, p. 382.

Heredity is an important factor in dental caries in rats. Hunt and Hoppert have produced two decidedly different strains of rats, one of which is extremely susceptible to dental caries in lower molar teeth and the other is very resistant. This investigation shows that the upper molar teeth of these susceptible and resistant rats have a lower incidence of caries than the lower molars of the same animals.

AMMONIA PRODUCTION IN SALIVA

R. M. Ballantyne, C. T. Clegg, J. J. Rae and F. H. Lawford, p. 385.

DETERMINATION OF UREA AND AMMONIUM SALTS IN AMMONIATED DENTIFRICES

W. A. Morgan and T. O. Norris, p. 388.

Preparation of an aqueous extract of the dentifrice is described. Urea in the extract is determined by the enzyme, urease, which converts urea to ammonium carbonate which is titrated with standard acid. The possible interference of some soluble salts is discussed. Qualitative tests for urea and boric acid are given.

Dibasic ammonium phosphate, $(NH_4)_2HPO_4$, is determined by steam distillation of the ammonia from a dispersion of the original sample in water, buffered at pH 7.4 with a

phosphate buffer. Decomposition of urea in the distillation is approximately 4 per cent.

AMMONIATED DENTIFRICES AND HAMSTER CARIES. II. THE EFFECTIVENESS OF BRUSHING THE TEETH WITH A CONTROL AND AN AMMONIATED DENTIFRICE

D. S. Chernausek and David F. Mitchell, p. 393.

This report is collateral with previously published data which showed a reduction in caries scores following the ingestion of dibasic ammonium phosphate and urea.

The study consisted of three groups: I—control, II—brushing control (neutral dentifrice), and III—experimental brushing (ammoniated dentifrice).

The animals were started on the experimental procedures at 30 days of age and the procedures were continued for 100 days. The animals' teeth in Groups II and III were brushed daily with small toothbrushes. Histological sections of liver, kidney and femur were secured from representative animals at necropsy. No changes attributable to the experimental procedures were observed. The caries scores were treated statistically. The male animals generally had higher caries scores than the female animals. Brushing the teeth, *per se*, reduced caries scores by approximately a half. No reduction attributable to the ammoniated compounds was shown. Some statistical procedures and data are listed which may be of aid in future studies.

A CLINICAL STUDY OF THE EFFECT OF TETRADECYLAMINE ON PLAQUE FORMATION

R. M. King, p. 399.

Standardized oral hygiene procedures were employed by a group of subjects to study the effect of several materials on bacterial plaque formation. The labial surfaces of anterior teeth were given a prophylaxis at the beginning of each trial period, and plaques were disclosed with Mercurochrome at the end. The brush and paste method was found to be superior to brushing with either water or medicinal paraffin oil, while a 1 per cent solution of tetradecylamine in medicinal paraffin was found to be almost 40 per cent more effective in inhibiting plaque growth than brushing with paste. It would appear that an adsorbed film had been formed in the mouth which had persisted long enough to have a significant influence on the reduction in plaque growth.

A DEMONSTRATION OF THE IMPORTANCE OF BICARBONATE AS A SALIVARY BUFFER

S. Wah Leung, p. 403.

The buffer values of 11 samples of paraffin stimulated human mixed saliva and 3 samples each of pilocarpine stimulated saliva from the parotid and submaxillary glands of dogs have been calculated from their CO_2 dissociation curves. The mean total buffer values calculated at pH 7.0, 7.7 and 7.3, respectively, are 0.0263 mole, 0.0485 mole and 0.0331 mole, for the three types of saliva, respectively. It was shown that in all instances the bicarbonates constitute from 80 to 95 per cent of the total buffer value. The remainder is probably due to the phosphates and proteins.

ISOLATION OF PLEUROPNEUMONIA-LIKE ORGANISMS FROM HUMAN SALIVA: A NEWLY DETECTED MEMBER OF THE ORAL FLORA

Harry E. Morton, Paul F. Smith, Ned B. Williams and Charles F. Eickenberg, p. 415.

The saliva samples of 46 of 100 individuals were positive for pleuropneumonia-like organisms. This is the first report of these organisms being present in high incidence in a region of the human body outside of the genitourinary tract. There appeared to be no correlation between the lactobacillus count and the presence of pleuropneumonia-like organisms. An enrichment medium is described which suppresses growth of gram-positive and gram-negative bacteria while permitting growth of the pleuropneumonia-like organisms.

THE OCCURRENCE OF MICROCOCCUS LACTILYTICUS IN THE DENTOBACTERIAL PLAQUE

J. J. Ennever, p. 423.

THE YEASTS OF THE NORMAL MOUTH AND THEIR RELATION TO SALIVARY ACIDITY

G. Young, H. G. Resca and M. T. Sullivan, p. 426.

Yeasts were cultivated from the salivas of approximately a half (48.6 per cent) of 584 healthy college students. Of the yeast-positive group, 79 per cent were still positive after two months. The number of yeasts ranged from 10 to 10,000 per milliliter of saliva, the majority of specimens showing counts of 1,000

or less. *Candida albicans* was identified in 93.8 per cent of the cultures; five other species of Candida were also found, and two of Cryptococcus. All subjects were classified, according to salivary acidity, at one-half pH units from 5.0 to 7.5. Yeasts were isolated from some salivas at all pH levels, but the incidence was considerably higher in the more acid salivas. A direct relation was shown between the incidence of *C. albicans* and the degree of salivary acidity.

A SIMPLIFIED METHOD OF RECOVERING THE ENAMEL MATRIX OF HUMAN ADULT TEETH

Victorino G. Villa, p. 431.

A method of recovering the enamel matrix after decalcification of the teeth in 5 per cent nitric acid is described. The materials used were all Filipino teeth. The procedure seems less tedious and does not require longer time as compared with some other methods. The results appear to indicate that the method may be used in the study of the histology and pathology of the organic constituent of the enamel. On the basis of the findings, it seems that the enamel matrix is lost largely because of rough handling of the specimen during processing rather than because of the dissolving action of the acid used in decalcification as generally believed.

AN X-RAY DIFFRACTION MICROCAMERA AND THE SPECIMEN PREPARATION FOR THE STUDY OF TOOTH STRUCTURE

Edward Klein, Otto R. Trautz, H. K. Addelston and I. Fankuchen, p. 439.

A simplified microcamera for routine work with tissue sections is described. The camera is characterized by a 32 micron slit capillary and 15 mm. specimen-to-film distance. The preparation of undecalcified enamel specimen includes cutting of 0.1 mm. thick sections with a diamond saw and grinding by hand to 0.05 mm. or less. Reflections have been recorded on the diffractogram of enamel which have not been previously demonstrated. A photomicrograph of the sample as mounted in the camera records the exact spot examined roentgenographically and permits the correlation of the sample and of the diffractogram.

STUDIES ON THE PHYSICAL PROPERTIES OF RODENT ENAMEL. I. THE MANLY-HODGE SEPARATION METHOD AS APPLIED TO THE TEETH OF THE RAT AND HAMSTER

J. Edward Gilda, p. 445.

The Manly-Hodge flotation method was used to separate enamel and dentin in small, pooled samples of rodent molar teeth. A single separation under conditions customarily employed for human teeth resulted in considerable contamination of both enamel and dentin fractions. Average percentage of junction particles (fragments composed of both enamel and dentin) for enamel samples from four or more rats was increased ninefold over reported values for human enamel fractions. Dentin fractions contained 16 times more enamel than previously reported as a contaminant of human dentin fractions. Two simple refractionation procedures were devised which increased the purity and completeness of the yield. The conclusion was drawn that the Manly-Hodge method should not be applied empirically to the teeth of experimental animals. Determination of purity is always indicated especially where analyses are made for substances which vary widely in concentration in the component parts of the tooth.

Cases and Comments

UNILATERAL ANKYLOSIS OF THE TEMPOROMANDIBULAR JOINT: REPORT OF A CASE

By Louis R. Weiss, D.D.S., Minneapolis.

Ankylosis of the temporomandibular joint is frequently caused by infectious arthritis, otitis media, or osteomyelitis of the ramus. In some instances it may result from trauma.

A 9 year old boy was referred to this office on August 23, 1943, by an orthodontist, with the complaint of inability to open his mouth normally for approximately five years.

History • His mother stated that the child had undergone a mastoidectomy at age 3½ or 4 years, and that total deafness in the left ear and trismus had appeared postoperatively. The boy had been seen by many physicians and dentists, but without success in treatment. Since the family had moved a great deal throughout the country it was impossible to get a more complete history.

Physical Examination • The condition of the mouth was fairly good. The patient had been keeping his mouth as clean as possible under the circumstances. Roentgenographic examination of the left temporomandibular joint showed an irregularly formed condyle with a saw-toothed superior surface (Fig. 1). The joint had very little mobility. The roentgenogram of the right side disclosed an almost normal condyle. There was mobility on the right side but the opening of the mouth was limited by the partial ankylosis on the left side. The patient was able to close his mouth in centric occlusion and to open it about 5 mm. from incisal edge to incisal edge. The mother reported that the boy had been examined by a pediatrician, who had found him in good condition except for being somewhat small for his age and slightly underweight.

Treatment • On August 27, 1943, the mouth was opened with some pressure, under nitrous oxide anesthesia. Great care was exercised in forcing open the mouth to prevent injury to the teeth and the bone. The patient was instructed to use a spring clothespin as constantly as possible, and by this means the mouth was forced open from 5 mm. to 10 mm.

Forcible opening under nitrous oxide anesthesia was repeated on September 3 and September 21, and the most successful result from this procedure was obtained on November 10, when the opening was increased to 20 mm. Impressions of the occlusal surfaces of the upper and lower teeth were taken and an Ivy pressure appliance (as illustrated in the American Dental Society publication *Lectures on Military Dentistry* pages 87, 88, 89) was made by a laboratory. Treatment with the spring clothespin was continued until February 1, 1944, when the appliance was tried in the mouth and adjusted for the patient's comfort. Both the patient and the mother were instructed in its use and care. From this date on continued improvement was evident at weekly examinations, and on July 7, 1944 the patient could open his mouth almost normally. He was able to eat with the rest of the family, felt much better, played with children his own age without a feeling of inferiority and had become quite extroverted.

To increase the tension when the appliance was in place, two small stainless steel springs were substituted for the rubber bands. The patient was instructed to wear the appliance for only a few hours a day and to return at monthly intervals.

Results • On November 4, 1944, a lateral roentgenogram (Fig. 2) disclosed a rounded left condyle, which functioned within normal limits and permitted opening of the mouth. The patient and the mother were extremely

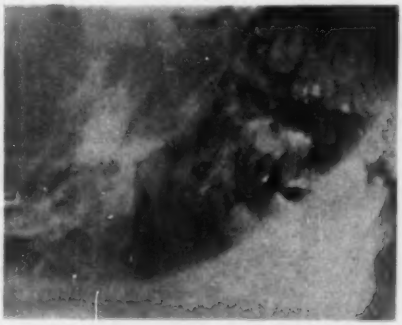

Fig. 1 • Left lateral view, on 8-26-43, shows irregular condyle and abnormal sigmoid notch. Note small opening of oral cavity

Fig. 2 • Left lateral view, on 1-7-44, shows nearly normal condyle and sigmoid notch

happy about the results. It was gratifying to note the changed mental outlook of the patient and his optimistic attitude toward the future, a complete reversal of his earlier unhappy and sullen attitude. He was examined for the last time on July 13, 1945.

Comments • The operator has a choice of methods in the treatment of ankylosis. In this case it was felt that satisfactory results could be obtained by purely mechanical means without subjecting the patient to surgery. This was considered advisable because of the patient's previous history with surgery and the fear of the parents for such further treatment.

The results are considered successful from every point of view: function was restored, and a dentist could now properly care for the teeth because sufficient access had been created, and because the patient's psychological reaction was so favorable.

1846 Medical Arts Building

COMBINED PROSTHODONTIC AND SURGICAL TREATMENT OF CLEFT PALATE: REPORT OF A CASE

By E. J. Fredrickson, D.D.S., consultant, Washington State Crippled Children's Program, and Children's Orthopedic Hospital, Seattle; and R. Grabosky, dental technician.

In the last few years, the dental and medical professions have become aware of the necessity for combining reparative surgery with maxillofacial prosthesis in the repair of facial defects. This is especially true in deformities about the face and jaws, when the success of plastic surgery depends to a great extent upon restoration of the normal contour of the region involved. In order to establish that contour, recognition of the importance of the underlying framework over which the soft tissues are to be repaired is essential. If missing bone or cartilage cannot be adequately replaced by a plastic procedure, prosthetic appliances must be used, either as a temporary measure or as a permanent restoration. This point is clearly demonstrable in cases in which the teeth and alveolar processes and part of the maxillae are missing. No matter how skillfully plastic repair of the lip is planned, desirable results in the contour of the lip and cheeks cannot be obtained unless adequate support from within the mouth is supplied.

The necessity for cooperation between plastic surgeon and the prosthodontist in the treatment of cleft palate is illustrated in the following case report.

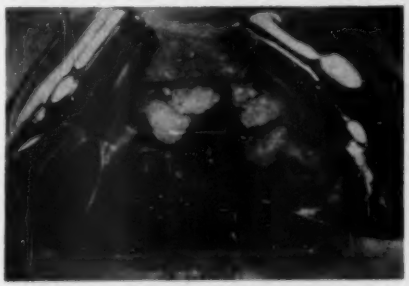

Fig. 1 • Cleft palate after 10 attempts at surgical repair without prosthodontic consultation

Fig. 2 • Malformed teeth, useless for prosthetic purposes, have been extracted

Fig. 3 • Prosthetic appliance in place

A girl, 4 years of age, was admitted to Children's Orthopedic Hospital, Seattle, in June 1939, for repair of a cleft palate. A bilateral cleft lip had been repaired in Juneau, Alaska, but three attempts to close the palate had been unsuccessful. At the Children's Hospital, seven operations on the palate were performed between June 1939 and October 1941.

In June 1949, consultants of the cleft palate clinic saw the child and recommended a prosthesis. Several malformed, malplaced teeth were present in the anterior and posterior regions on the left side. Openings on each side of the premaxilla, 10 mm. and 80 mm. in diameter, extended into the nasal passages, and another large opening, about 20 mm. in diameter, was present at the midline (Fig. 1). On the right side, the posterior region was completely devoid of alveolar process, but scar tissue extended laterally, at what would be the junction of the hard and soft palate, to the alveolar process on the left side. The soft palate was short.

The malformed teeth that could not be utilized for prosthetic purposes were extracted (Fig. 2), the three remaining teeth were filled and, with a prosthetic appliance, the result shown in Figure 3 was obtained.

Further surgical repair of the nose and lips is planned, as well as surgical lengthening of the soft palate.

Contributors to Progress • The scientific and intellectual advances of a nation are generated by a comparatively small number of people. These few—the inventors, scientists, thinkers and scholars who have given us the Declaration of Independence and atomic energy, railroads and radar, antibiotics and masterpieces of music and literature—have contributed to civilization out of all proportion to their numbers. In the U. S. we think immediately of such giants as Thomas Jefferson, Benjamin Franklin, Josiah Willard Gibbs, Thomas Hunt Morgan, Alexander Graham Bell, John Dewey, Mark Twain and Walt Whitman. But the geniuses represent only a part of a nation's intellectual resources; for every genius there are hundreds of less eminent but highly competent men and women who also contribute significantly to the nation's intellectual progress. *Dael Wolfle, "Intellectual Resources," Scientific American 185:42, September 1951.*

Deaths

Aiken, George E., Kansas City, Mo.; Western Dental College, Kansas City, 1904; died July 27; aged 73.

Bartlett, Donald S., Waukegan, Ill.; Louisville College of Dental Surgery of Centre College, 1918; died August 13; aged 58.

Bennett, David W., Seattle; College of Dentistry, University of Minnesota, 1904; died August 6; aged 70.

Berger, Hulda E., New York; College of Dentistry, University of Minnesota, 1914; died August 24; aged 60.

Bergland, Clarence O., Robbinsdale, Minn.; College of Dentistry, University of Minnesota, 1922; died August 7; aged 53.

Britton, Louis, Philadelphia; Pennsylvania College of Dental Surgery, Philadelphia, 1894; died July 27; aged 78.

Brockman, William H., Eldon, Mo.; School of Dentistry, Washington University, St. Louis, 1916; died in August.

Brown, Erwin G., Wilbur, Wash.; School of Dentistry, North Pacific College of Oregon, 1925; died July 16; aged 52.

Brown, John W., Griffith, Ind.; Indiana Dental College, Indianapolis, 1915; died August 15; aged 69.

Burns, John A., Fall River, Mass.; School of Dentistry, University of Pennsylvania, 1913; died July 21; aged 62.

Chester, John, Staatsburg, N. Y.; College of Dentistry, New York University, 1900; died July 8.

Clawson, Harry F., Warren, Pa.; Philadelphia Dental College, 1902; died July 16; aged 75.

Close, Hugh W., Philadelphia; School of Dentistry, University of Pennsylvania, 1912; died July 29; aged 60.

Courtney, Terence F., Chicago; Chicago College of Dental Surgery, Loyola University, 1920; died August 8.

Dietz, Bernard I., Washington, D. C.; School of Dentistry, Georgetown University, 1917; died July 28; aged 54.

Domurat, Titus, Chicago; died July 11; aged 63.

Dorsey, Chester W., San Francisco; School of Dentistry, University of Louisville, 1902; died July 15.

Eames, Haller B., Chatham, N. Y.; Dental School, Tufts College, 1909; died July 25; aged 65.

Elder, William J., Norristown, Pa.; Pennsylvania College of Dental Surgery, Philadelphia, 1896; died August 12.

Erickson, Rufus O., Waukesha, Wis.; Dental School, Marquette University, 1919; died July 30; aged 55.

Ewart, Albert C., Marysville, Kan.; Western Dental College, Kansas City, 1899; died April 16; aged 82.

Fahey, Edward V., Pittsburgh; School of Dentistry, University of Pittsburgh, 1931; died August 15; aged 48.

Fatland, Olaf S., Colfax, Iowa; College of Dentistry, University of Iowa, 1918; died August 12; aged 56.

Faulconer, William T., Memphis, Tenn.; School of Dentistry, Washington University, St. Louis, 1929; died August 18; aged 45.

Fink, Benjamin, New York; College of Dentistry, New York University, 1923; died August 5; aged 52.

Gilliam, Paul S., Washington, D. C.; School of Dentistry, Georgetown University, 1917; died July 16.

Glew, Hubert M., Preston, Iowa; Chicago College of Dental Surgery, Loyola University, 1905; died July 21; aged 73.

Gould, Percival A., Gibsonburg, Ohio; died July 28; aged 79.

Grady, Luke F., Bradford, Pa.; School of Dentistry, University of Pennsylvania, 1903; died August 7.

Harris, Edward E., Yreka, Calif.; College of Dentistry, University of California, San Francisco, 1923; died August 8; aged 57.

Hartung, William J., Minneapolis; College of Dentistry, University of Minnesota, 1911; died August 8; aged 64.

Hartzell, Thomas B., Minneapolis; College of Dentistry, University of Minnesota, 1893; died August 26; aged 85.

Havens, Donnell D., Klamath Falls, Ore.; School of Dentistry, North Pacific College of Oregon, 1919; died July 22; aged 57.

Heininger, Oscar H., Burlington, Vt.; Baltimore College of Dental Surgery, University of Maryland, 1910; died August 9; aged 63.

Heyser, William T., Washington, D. C.; Dental Department, National University, Washington, D. C., 1897; died July 27.

Hooker, Alfred L., West Palm Beach, Fla.; Dental School, Tufts College, 1917; died June 5; aged 58.

Kalmus, Morris, New York; Baltimore College of Dental Surgery, University of Maryland, 1920; died July 15; aged 59.

Keith, Cassius C., Hastings, Neb.; Dental School, Northwestern University, 1904; died August 7.

King, Otto U., Huntington, Ind.; Dental School, Northwestern University, 1897; died August 13.

Klepinger, Warren P., Monrovia, Calif.; Ohio College of Dental Surgery, University of Cincinnati, 1901; died August 9; aged 74.

Kuehnert, Arno J., Santa Monica, Calif.; Dental School, Northwestern University, 1930; died August 8; aged 44.

Lawrence, William H., Bryan, Texas; died May 14.

Lehman, John W., Portland, Ore.; College of Physicians and Surgeons, San Francisco, 1902; died August 1, aged 80.

Levine, William, Jersey City; Pennsylvania College of Dental Surgery, Philadelphia, 1904; died July 24; aged 70.

Lowe, Charles T., Cincinnati; School of Dentistry, University of Pittsburgh, 1920; died July 4.

Maddren, James W., St. Johnsville, N. Y.; College of Dentistry, New York University, 1907; died August 11.

Mahan, Royster W., Topeka, Kan.; died July 21.

Marchand, Larry M., Cottonport, La.; School of Dentistry, Tulane University, 1911; died in March; aged 68.

Martin, Nathaniel R., Lynn, Mass.; died August 4.

McElroy, Hugh G., Dover, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1909; died July 26; aged 65.

McKee, William G. S., Pittsburgh; School of Dentistry, University of Pittsburgh, 1925; died July 25; aged 50.

McQuillan, Herbert A., Fargo, N. D.; College of Dentistry, University of Minnesota, 1929; died August 2; aged 47.

McWilliams, William H., Darlington, Wis.; College of Dentistry, University of Illinois, 1904; died July 23; aged 68.

Menn, Samuel, New York; New York College of Dentistry, 1923; died July 18; aged 56.

Mickens, George E., Butler, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1913; died August 9.

Monaghan, Robert D., Tacoma, Wash.; College of Dentistry, University of Minnesota, 1914; died August 22; aged 56.

Moore, Henry B., Owosso, Mich.; School of Dentistry, University of Michigan, 1905; died June 19.

Morgan, Harry, Monterey, Calif.; Chicago College of Dental Surgery, Loyola University, 1902; died August 22; aged 74.

Nance, Ed F., Los Angeles; College of Dentistry, University of Southern California, 1911; died August 6; aged 65.

Nash, John G., Salem, Ore.; School of Dentistry, North Pacific College of Oregon, 1913; died July 28; aged 65.

O'Connell, Jeremiah J., New Britain, Conn.; Baltimore College of Dental Surgery, University of Maryland, 1912; died July 30; aged 76.

O'Shaunecy, James W., Buffalo; School of Dentistry, University of Buffalo, 1919; died August 7; aged 57.

Parks, Thomas F., Wakefield, Mass.; Baltimore College of Dental Surgery, University of Maryland, 1904; died July 25; aged 73.

Pearlman, Alfred E., Rochester, N. Y.; School of Dentistry, University of Pennsylvania, 1920; died July 6.

Piedalue, Robert J., Seattle; College of Dentistry, Creighton University, 1916; died August 14.

Purdie, John C., Chicago; Chicago College of Dental Surgery, Loyola University, 1907; died July 26; aged 76.

Quitt, Leon E., New York; died May 1.

Reich, Harry, New York; College of Dentistry, New York University, 1915; died July 20; aged 59.

Reinders, Fred W., Mount Pulaski, Ill.; School of Dentistry, University of Indiana, 1903; died May 8.

River, Joseph P., Oakland, Calif.; College of Dentistry, University of California, 1899; died August 11; aged 78.

Sanders, Samuel E., Villa Park, Ill.; Dental School, Northwestern University, 1917; died August 26; aged 63.

Sargent, Maurice E., Franklin, N. H.; Pennsylvania College of Dental Surgery, Philadelphia, 1899; died in July.

Schemel, John H., Syracuse, N. Y.; School of Dentistry, University of Buffalo, 1915; died June 19; aged 58.

Schlund, Jacob B., Tacoma, Wash.; St. Louis Dental College, 1905; died June 30; aged 75.

Schneider, George, La Salle, Ill.; Chicago College of Dental Surgery, Loyola University, 1900; died July 15; aged 84.

Segue, Taylor A., New Orleans; College of Dentistry, Howard University, 1922; died July 9; aged 52.

Seidenberg, Louis, Chicago; Chicago College of Dental Surgery, Loyola University, 1918; died August 7; aged 60.

Shaffer, Lee H., Monmouth, Ill.; Dental School, Northwestern University, 1911; died May 27; aged 66.

Sherwin, Lawrence W., Cortland, N. Y.; School of Dentistry, University of Pennsylvania, 1917; died June 25; aged 60.

Smith, E. Marvin, Clarksville, Texas; Southern Dental College, Atlanta, 1901; died June 20; aged 73.

Smith, Garnett H., Jeffersontown, Ky.; School of Dentistry, University of Louisville, 1900; died August 12.

Smith, Gideon H., Sausalito, Calif.; College of Physicians and Surgeons, San Francisco, 1902; died August 7; aged 76.

Spurgeon, Charles W., Hermann, Mo.; Western Dental College, Kansas City, 1924; died June 18; aged 50.

Stack, Walter O., Claymont, Del.; Baltimore College of Dental Surgery, University of Maryland, 1897; died July 12; aged 79.

Stanfield, Leonard E., Donna, Texas; died July 27.

Stewart, Charles F., Oklahoma City; Kansas City Dental College, 1902; died July 11; aged 74.

Stewart, Ernest I., Logan, Utah; Chicago College of Dental Surgery, Loyola University, 1909; died July 21; aged 69.

Stokes, Hannon C., Kansas City, Mo.; Kansas City Dental College, 1904; died August 16.

Stradling, Joseph T., Bristol, Pa.; Pennsylvania College of Dental Surgery, Philadelphia, 1881; died June 30; aged 91.

Strickler, Mary R., Denver, Colo.; died July 10.

Stuart, Carroll W., Chicago; College of Dentistry, University of Illinois, 1912; died July 1.

Swan, Charles J., Clearfield, Iowa; College of Dentistry, University of Iowa, 1903; died June 18; aged 76.

Sweeney, James T., Lodi, Calif.; College of Dentistry, University of California, 1926; died June 24; aged 58.

Taylor, Henry E., Athens, Ga.; Atlanta—Southern Dental College, 1931; died August 5; aged 45.

Terry, Edwin B., Utica, N. Y.; School of Dentistry, University of Buffalo, 1923; died August 7; aged 55.

Thayer, James L., Abilene, Kan.; Western Dental College, Kansas City, 1902; died July 1; aged 72.

Thomas, Harry S., Dallas, Texas; died June 30.

Thompson, Winton L., Nashville, Tenn.; Ohio College of Dental Surgery, University of Cincinnati, 1914; died July 14; aged 58.

Thorsness, Arlo W., Spooner, Wis.; Dental School, Northwestern University, 1917; died June 21; aged 58.

Tremain, Ivan R., San Francisco; College of Physicians and Surgeons, San Francisco, 1912; died June 27; aged 65.

Troyan, Edward J., Cleveland; School of Dentistry, Western Reserve University, Cleveland, 1913; died August 6; aged 67.

Tucker, Orville C., Joliet, Ill.; Dental School, Northwestern University, 1928; died June 14.

Twiggar, Vernon B., Shamokin, Pa.; School of Dentistry, University of Pennsylvania, 1901; died August 2; aged 75.

Wagoner, William E., Marion, Ind.; Dental School, Northwestern University, 1900; died July 5.

Walker, Slater R., Pittsburgh; School of Dentistry, University of Pennsylvania, 1912; died July 20; aged 65.

Walker, William K., Orangeburg, S. C.; School of Dentistry, Vanderbilt University, 1905; died July 5; aged 68.

Walther, Guido A., Chicago; Chicago College of Dental Surgery, Loyola University, 1906; died May 12; aged 68.

Waters, Frank T., Orange, Mass.; Pennsylvania College of Dental Surgery, Philadelphia, 1899; died July 2; aged 75.

Watson, Marion R., Statesboro, Ga.; Atlanta—Southern Dental College, 1943; died May 27; aged 31.

Weaver, Kemper K., Dayton, Ohio; College of Dentistry, Ohio State University, 1914; died August 8; aged 61.

Westlake, Albert J., Asbury Park, N. J.; died August 11; aged 77.

White, Charles E., Gladewater, Texas; College of Dentistry, Baylor University, 1919; died June 19; aged 62.

Wilher, Jerome L., Chicago; Dental School, Northwestern University, 1918; died September 7; aged 56.

Williams, Harry C., Sheboygan, Wis.; Dental School, Northwestern University, 1916; died July 12; aged 58.

Wilson, Sidney E., Laurel, Miss.; School of Dentistry, Tulane University, 1912; died July 15; aged 61.

Winter, Gordon R., Philadelphia; School of Dentistry, University of Pennsylvania, 1919; died July 30.

Winter, Seward R., Minneapolis; College of Dentistry, University of Minnesota, 1909; died August 2; aged 73.

Workman, Saul G., Nashville, Tenn.; School of Dentistry, Vanderbilt University, 1905; died July 29; aged 69.

Wright, Bruce C., Humansville, Mo.; Western Dental College, Kansas City, 1917; died June 24; aged 59.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Third Annual Session	Sept. 8-11, 1952	St. Louis
Ninety-Fourth Annual Session	Sept. 28-Oct. 1, 1953	Cleveland
Ninety-Fifth Annual Session	Nov. 8-11, 1954	Miami

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 14, 15, 1952	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Alaska	July 14-17, 1952	Anchorage	R. A. Smithson	Box 1293, Anchorage
Arizona		Phoenix	E. M. Scott	1017 Professional Bldg., Phoenix
Arkansas	Apr. 6-9, 1952	Little Rock	D. M. Hamm	White Bldg., Clarksville
California	Apr. 21-23, 1952	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California			C. A. Moss	1401 S. Hope St., Los Angeles
Colorado	Oct. 5-8, 1952	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	May 21-23, 1952	Bridgeport	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 1952		S. J. Krygier	309 S. State St., Dover
District of Columbia	Mar. 9-12, 1952	Washington	K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Apr. 20-23, 1952	Jacksonville	T. A. Price	808 Congress Bldg., Miami
Georgia	Oct., 1952	Savannah	J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii		Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho	June 30-July 2, 1952	Sun Valley	F. E. Carpenter	123 Main Ave., Twin Falls
Illinois	May 19-22, 1952	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 12-14, 1952	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 5-7, 1952	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 4-7, 1952	Topeka	F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	Mar. 31-Apr. 2, 1952	Louisville	A. B. Coxwell	1976 Douglas Blvd., Louisville
Louisiana	Apr. 17-19, 1952	Shreveport	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June, 1952	Rockland	S. Gower	Skowhegan
Maryland	May 4-7, 1952	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts	May 4-7, 1952	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 21-23, 1952	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 18-20, 1952	St. Paul	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	June 9-12, 1952	Biloxi	H. M. Campbell	428 Gloster St., Tupelo
Missouri	Sept. 12, 1952	St. Louis	R. R. Rhoades	201 Merchants Bank Bldg., Jefferson City
Montana	May 8-10, 1952	Butte	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 12-14, 1952	Omaha	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	June, 1952	Reno	R. La Fond	Medical Dental Bldg., Reno
New Hampshire	June 29-July 1, 1952	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 23, 24, 1952	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	Apr. 14-16, 1952	Roswell	J. S. Ellar	Suite 7, Medical Arts Square, Albuquerque
New York	May 12-15, 1952	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 11-14, 1952	Pinehurst	B. N. Walker	Liberty Life Bldg., Charlotte
North Dakota	May 15-17, 1952	Minot	J. H. Lunday	302 Black Bldg., Fargo
Ohio			E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23, 1952	Oklahoma City	R. C. Calkin	Calkin Bldg., Guthrie
Oregon	Mar. 3-5, 1952	Portland	H. C. Fixott, Jr.	308 Selling Bldg., Portland
Panama Canal Zone	Dec.	Balboa	O. Slavin	Box 415, Balboa
Pennsylvania	May 4-7, 1952	Reading	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 25-27, 1952	San Juan	R. Carrasquillo	Box 214, Rio Piedras
Rhode Island	Jan. 1952	Providence	M. L. Biderman	144 Westminster St., Providence
South Carolina		Greenville	J. R. Owings	7 Medical Court, Greenville
South Dakota	May 18-20, 1952	Mitchell	E. W. Elmen	Sioux Falls
Tennessee	May 5-7, 1952	Memphis	W. L. McCulley	Brown Bldg., Cleveland

State	Date	Place	Secretary	Address
Texas	Apr. 28-May 1, 1952	Fort Worth	W. Ogle	3607 Gaston Ave., Dallas
Utah			E. O. Thompson	915 Medical Arts Bldg., Salt Lake City
Vermont	May, 1952	Woodstock	W. J. Reardon	Rutland
Virginia	Apr. 28-30, 1952	Virginia Beach	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	May 15-17, 1952	Seattle	C. R. Flood	230 Cobb Bldg., Seattle
West Virginia	July, 1952	White Sulphur Springs	A. B. Drake	508 West Virginia Bldg., Huntington 1
Wisconsin	Apr. 14-17, 1952	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming		Casper	T. J. Drew	State Capitol Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 16, 1952	Birmingham	M. D. Edwards	132 Adams Ave., Montgomery
Alaska	July 7-11, 1952	Anchorage	J. H. Geyer	P. O. Box 915, Juneau
Arizona			R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 23-26, 1952		H. O. Weatherly	205 Halter Bldg., Conway
California			K. I. Nesbitt	507 Polk St., San Francisco 2
Colorado	June 23-27, 1952	Denver	C. K. Phillips	724 Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. M. Falls	1801 Eye St., N. W., Washington 6
Florida	July 7-12, 1952*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			S. H. Yarbrough	Medical Arts Bldg., Columbus
Hawaii			H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho			W. K. Adams	718 Arthur St., Caldwell
Illinois			W. A. McKee	503 Wood Bldg., Benton
Indiana			C. A. Frech	504 Broadway, Gary
Iowa	May 19-23, 1952	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas	Dec. 10-14	Kansas City	G. L. Teall	Box 71, Hiawatha
Kentucky			R. I. Todd	Western Union Bldg., Richmond
Louisiana			A. R. deNux	Markaville
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland			H. Levin	3429 Park Heights Ave., Baltimore 15
Massachusetts			J. C. Wilson	State House, Boston 33
Michigan	Jan 27-Feb. 2, 1952 June 8-14, 1952	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota			F. A. Larson	1632 Washington St., N. E., Minneapolis
Mississippi	Jan. 7, 1952	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana			P. M. Feda	Box 865, Helena
Nebraska			C. A. Bumstead	924 Stuart Bldg., Lincoln
Nevada			G. C. Steinmiller	Masonic Temple, Reno
New Hampshire			J. B. Brown	5 N. State St., Concord
New Jersey			W. A. Wilson	150 E. State St., Trenton 8
New Mexico			J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 7-11, 1952	Fargo	A. B. Crabtree	Ellendale
Ohio			H. B. Smith	322 E. State St., Columbus
Oklahoma			J. B. Cole, Jr.	706 Asp, Norman
Oregon	Dec. 3-6*	Portland	A. F. Davis	306 Public Service Bldg., Portland
Pennsylvania	Dec. 3-5‡ Dec. 6-8** Dec. 8††	Philadelphia	R. E. V. Miller	Northampton National Bank Bldg., Easton
Puerto Rico		Santurce	L. C. Coll	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			T. C. Sparks	1315 Pickens St., Columbia
South Dakota			K. A. Stormo	Lead
Tennessee			F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin

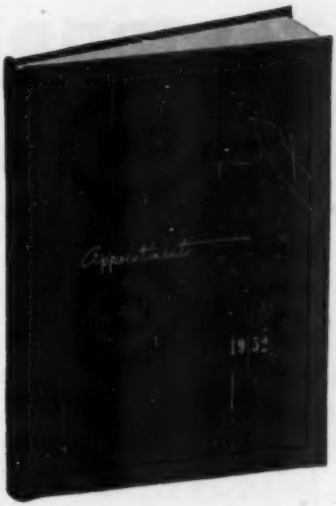
*Dentistry and dental hygiene.
**Dental clinical examinations.

‡Dental and dental hygiene written examinations.
††Dental hygiene clinical examinations.

State	Date	Place	Secretary	Address
Utah			F. E. Lees	324 State Capitol Bldg., Salt Lake City
Vermont			F. A. Reid	Windsor
Virginia			J. M. Hughes	715 Medical Arts Bldg., Richmond 19
Washington			J. B. Kiefer, Jr.	510 Cobb Bldg., Seattle
West Virginia	June 23-25, 1952	West Liberty	C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin			S. F. Donovan	Tomah
Wyoming	June 23-25, 1952	Casper	W. A. Hocker	212 O & S Bldg., Casper

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	Mar. 16-22, 1952	New Orleans	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Dental Medicine	Dec. 2	New York	W. M. Greenhut Secy.	124 E. 84th St., New York 28
American Academy of Oral Pathology	Feb. 3, 1952	Chicago	J. L. Bernier Secy.	Registry of Dental and Oral Pathology, Army Medical Museum, Washington, D.C.
American Association of Industrial Dentists	Apr. 22-24, 1952	Cincinnati	E. A. Aston Secy.	1400 N. Cameron St., Harrisburg, Pa.
American Association of Orthodontists	Apr. 21-24, 1952	St. Louis	G. R. Moore Secy.	919 Oakland Ave., Ann Arbor, Mich.
American Board of Orthodontics	Apr. 16-20, 1952	St. Louis	C. E. Martinek Secy.	661 Fisher Bldg., Detroit 2
American Denture Society	Feb. 2, 3, 1952	Chicago	A. L. Roberts Secy.	Aurora National Bank Bldg., Aurora, Ill.
Chicago Dental Society	Feb. 4-7, 1952	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Council on Dental Education, Division of Aptitude Testing	Mar. 7, 8, 1952		S. Peterson Secy.	222 E. Superior St., Chicago 11
Denver Dental Association	Jan. 6-9, 1952	Denver	R. R. Maier Secy.	724 Republic Bldg., Denver 2
Eleventh International Dental Congress	July 19-26, 1952	London, England	D. Downton Hon. Secy.	13 Hill St., London W. 1, England
Greater New York Dental Meeting	Dec. 3-7	New York	S. G. Standard Gen. Chm.	Room 106A, Statler Hotel, New York 1
Greater Philadelphia	Jan. 30-Feb. 1, 1952	Philadelphia	R. Adams Secy.	1411 Walnut Street Bldg., Philadelphia 2
International Academy of Anesthesiology	Feb. 6, 1952	New York	I. G. Tomack Secy.	355 E. 149th St., New York 55
National Board of Dental Examiners	Dec. 3, 4		S. Peterson Secy.	222 E. Superior St., Chicago 11
Northwest Conference in Dental Medicine	Apr. 13-17, 1952	Hood River, Ore.	P. L. Meacham, Secy.	426 Medical Arts Bldg., Portland, Ore.
Southern Academy of Oral Surgery	Mar. 22, 23, 1952	Atlanta, Ga.	R. F. Sullivan Secy.	118 E. Jones St., Savannah, Ga.
Southern Society of Orthodontists	Aug. 10-13, 1952	Asheville, N. C.	F. P. Bowyer Secy.	608 Medical Arts Bldg., Knoxville, Tenn.
Thomas P. Hinman Mid-Winter Clinic	Mar. 23-26, 1952	Atlanta, Ga.	R. D. Robinson Gen. Chm.	832 Candler Bldg., Atlanta, Ga.



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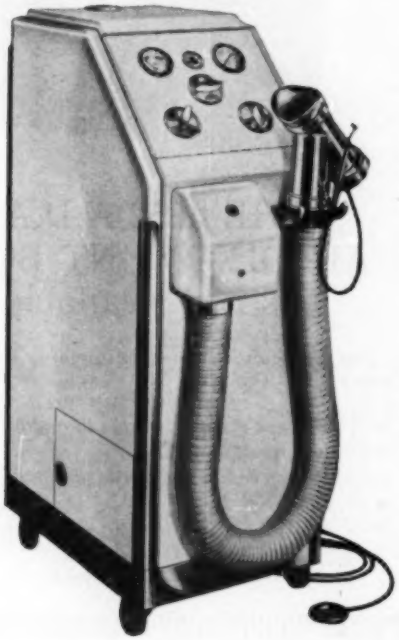

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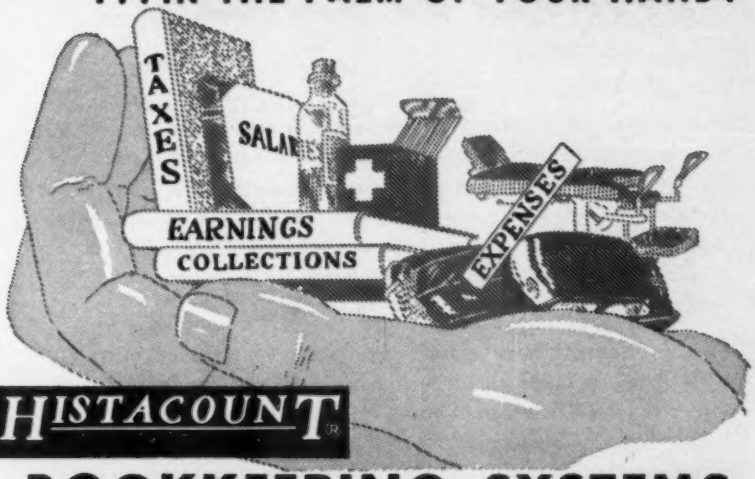

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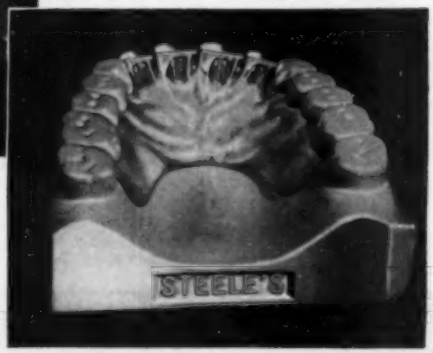

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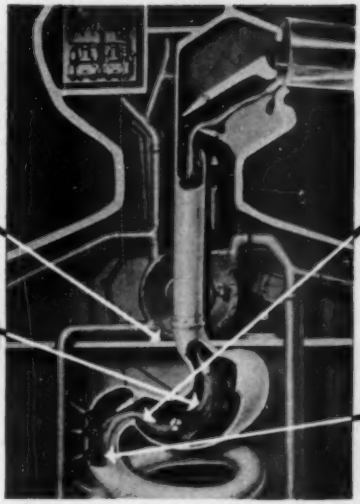

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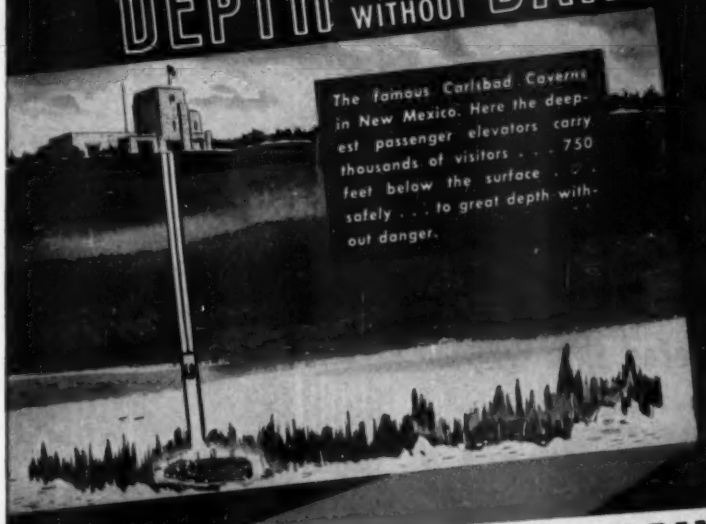

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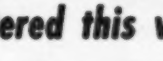

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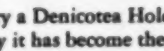

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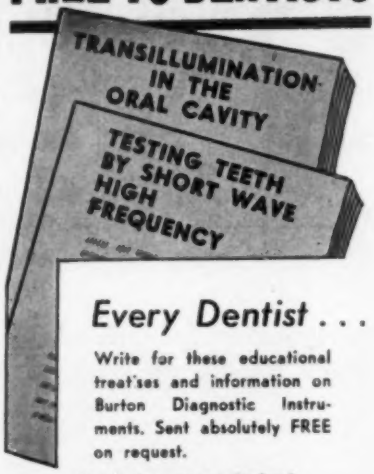

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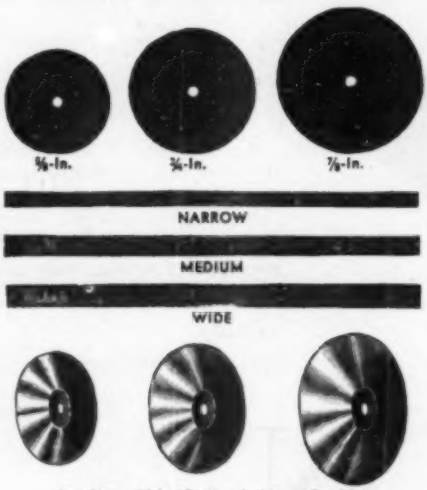

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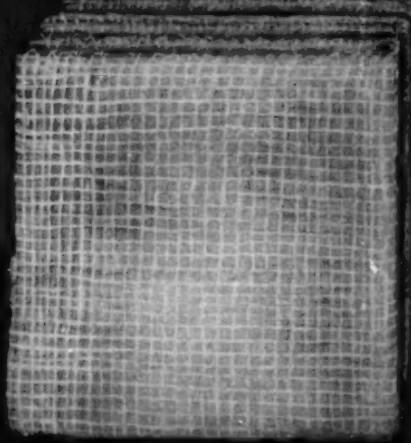

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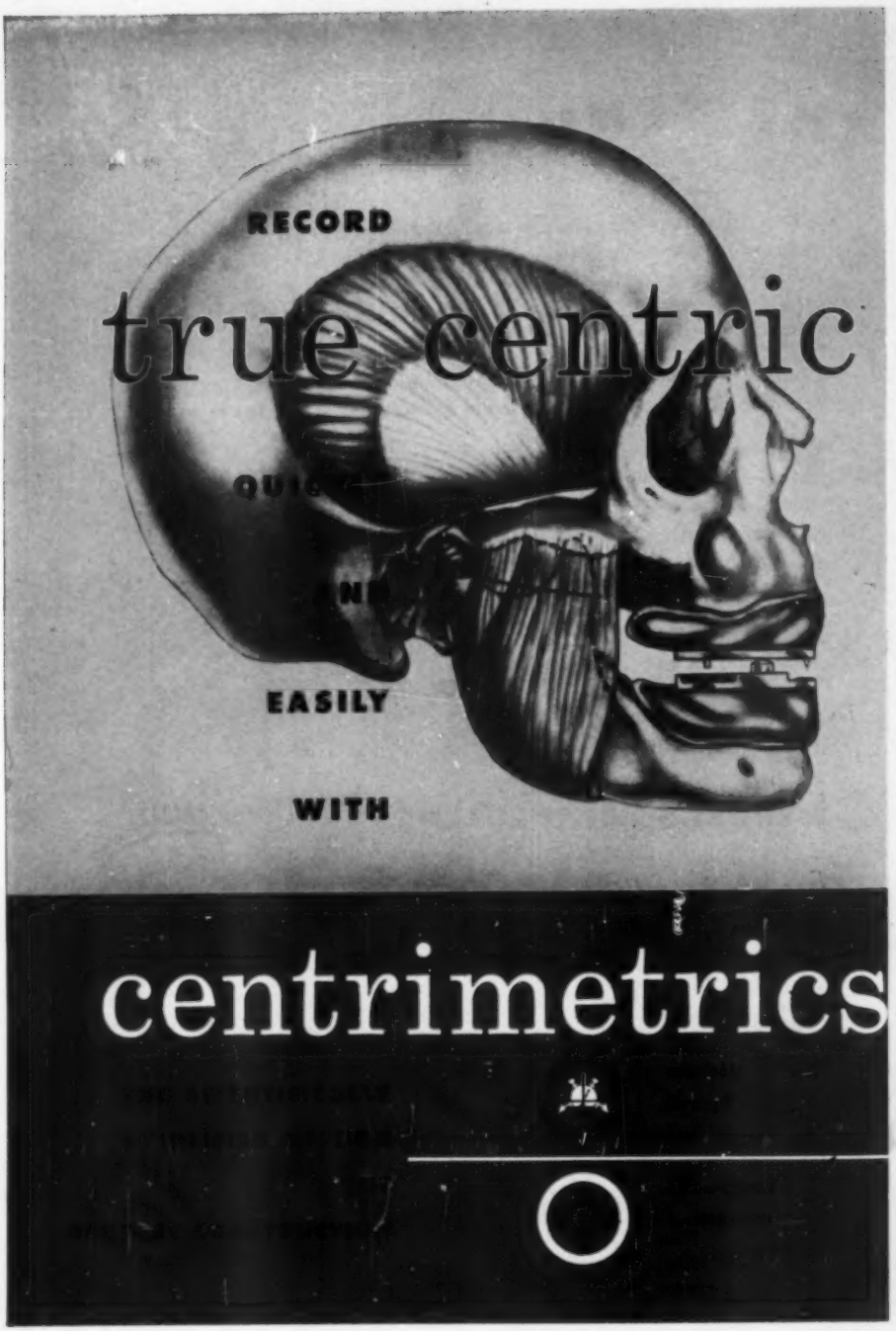
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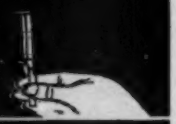

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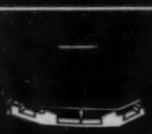

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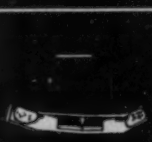

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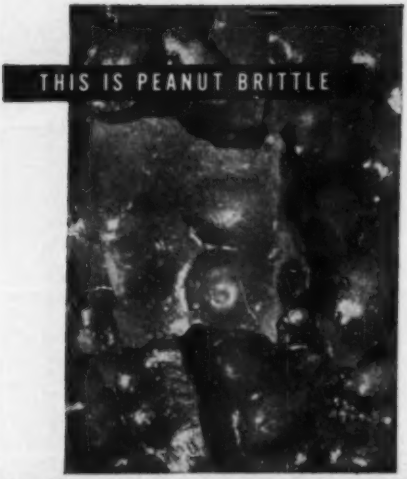

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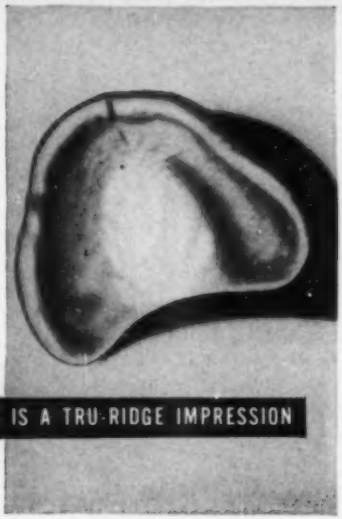

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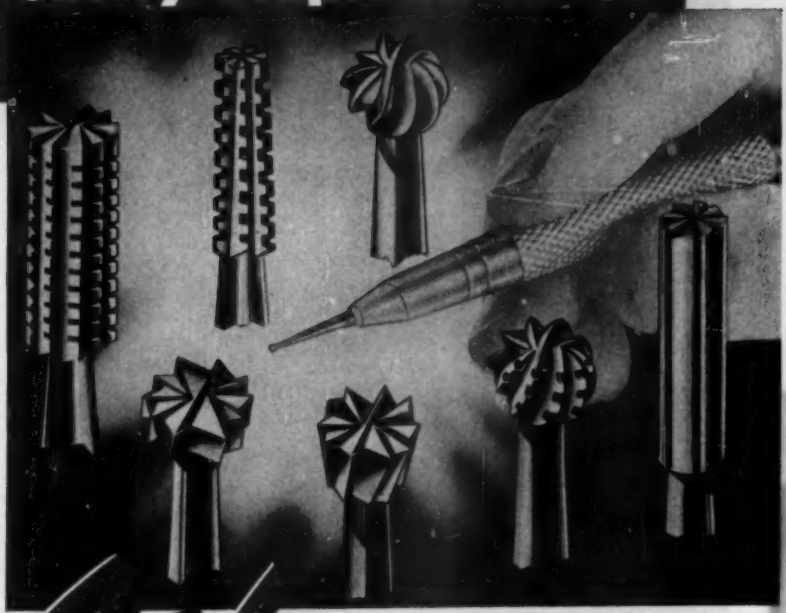

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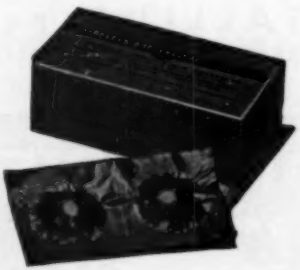

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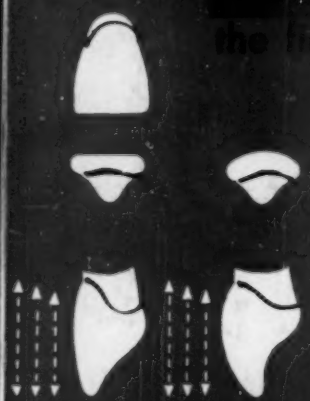

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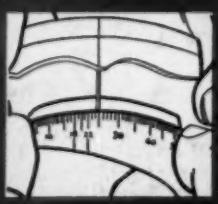

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